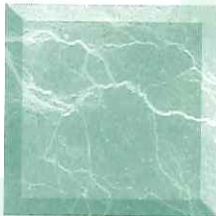




Pfizer Pharmaceuticals, Inc

**COGENERATION EXPANSION PROJECT  
(BUILDING B-113)**

June 17, 1996





Pfizer Pharmaceuticals, Inc.  
Rd. 2, Km. 58.2, P.O. Box 628  
Barceloneta, P.R. 00617  
Tel. (809) 846-4300/846-4408  
Fax (809) 846-7022

## Pharmaceuticals

Anthony J. Maddaluna  
General Manager

June 18, 1996

Mr. Francisco Claudio  
Puerto Rico Environmental Quality Board  
Air Quality Section  
National Plaza Building  
431 Ponce de León  
Hato Rey, PR 00917

Dear Mr. Claudio:

### Re: PPI Utility Expansion Application to Construct

PPI is planning to expand its existing utility plant. The project is essentially the same as what was described to you in our preliminary meeting of May, 1993. The project includes the installation of five 1600 KW diesel engine electric generators, a 30,000 lb./hr. heat recovery steam generator (HRSG), and a 30,000 lb./hr steam package boiler. The diesel engines will be equipped with a two stage Selective Catalytic Reduction (SCR) system to minimize NO<sub>x</sub> emissions. Both the HRSG and the package boiler will be installed with low NO<sub>x</sub> burners. A continuous emission monitor (CEM) will be installed to continuously verify low NO<sub>x</sub> emissions from the engines and HRSG. The utility plant will burn only low sulfur fuel (<0.2% S) to minimize emissions of SO<sub>2</sub>. A tall stack (~190 feet) will be installed to minimize ground level emission impacts. Also, as part of the project, two existing steam boilers will be retired.

PPI is expanding the existing utility plant for a number of reasons including: to provide emergency power capabilities; to support current and future plant steam needs (including steam to undertake important waste minimization initiatives); and to improve efficiency of energy use at the facility.

The projected emissions from the project are well below USEPA Prevention of Significant Deterioration (PSD) and EQB's Location Approval Significant Levels. Project emissions are summarized in Section 1.6 of the attached document. At your suggestion the project was reviewed by USEPA and after a detailed review, our emission calculations have confirmed that the project is not subject to PSD air permitting requirements (see Section 3.1 for USEPA's PSD Non-Applicability Determination with attached recommended construction permit conditions).

As discussed with you at the time of our initial meeting, this project will result in significant environmental benefits. On a site wide basis, it will result in substantial decreases in actual current SO<sub>2</sub> emissions (~25 tons/yr.) and newly permitted NO<sub>x</sub> emissions will be less than

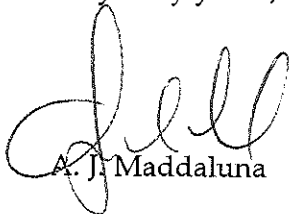
Mr. Francisco Claudio  
June 18, 1996  
Page 2 of 2

currently permitted. Further, on an island wide basis, overall environmental benefits could be substantial since on-site production of electricity with a co-generation system employing state-of-the-art emission controls will produce significantly less pollutants per equivalent unit of energy than does a PREPA facility.

Our project schedule is that within one month of your approval, PPI will install and begin operation of the package boiler. The diesel engines and HRSG are expected to become operational within one to two months of your approval. When the package boiler becomes operational, one of the two existing boilers will be used for steam generation. The other boiler will be idle. When the entire expansion project is operational, both of the existing boilers will be decommissioned and removed.

We would appreciate your prompt review of the application and incorporation of EPA's suggested permit conditions (as attached to the November 30, 1995 letter from USEPA-see Section 3.1).

Very truly yours,



A. J. Maddaluna

c: Carlos Lopez - PPI  
Ramón Marrero - PPI  
John Keith - Pfizer Corporate

Attachments  
doc. cogen

## **Table of Contents**

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## **Section 1.0**

### **Checklist and Application Forms**

## **Section 1.1**

### **Application Checklist**



Junta de  
Calidad  
Ambiental

ETADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DEL GOBERNADOR

AREA CALIDAD DE AIRE

DOCUMENTOS A SOMETERSE PARA PROYECTOS  
POR LEY DE CERTIFICACION  
(Para el uso del Ingeniero)

FORMULARIO DE RADICACION  
&  
DOCUMENTOS A SOMETERSE

1996 JUN 18 PM 2:57  
AREA CALIDAD DE AIRE

Barceloneta, P.R.

13 de junio de 1996

PRE 09-0393-0282-I-II-III-0

09-0696-0669-DIC

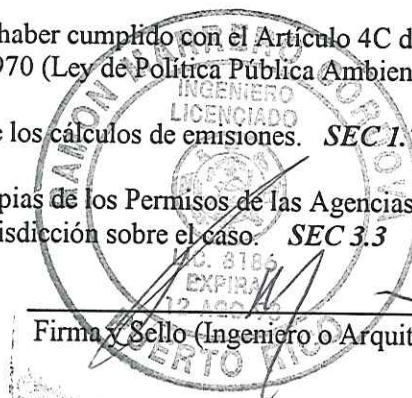
Hoja de Cotejo

Para someter formularios de permiso de construcción u operación adjunto, a tramitarse bajo las disposiciones del Reglamento para la Certificación de Planos y Documentos ante la Junta de Calidad Ambiental.

- | <u>Ing. o Arq.</u> | <u>Ing. JCA</u> |   |
|--------------------|-----------------|---|
| (X) ( )            | ( )             | - Dos copias formulario de radicación   |
| (X) ( )            | ( )             | - Dos copias formularios de permiso para construir u Operar una Fuente de Emisión en Puerto Rico, firmada y sellada por Ingeniero o Arquitecto practicando la profesión en Puerto Rico. |
| (X) ( )            | ( )             | - Evidencia de haber cumplido con las cuotas del C.I.A.A. <b>SEC 4.1</b>  |
| (X) ( )            | ( )             | - Cumplir con la Regla 501 del Reglamento para el Control de la Contaminación Atmosférica (cargos por radicación y permiso)   |
| (X) ( )            | ( )             | - Evidencia o pago de sellos: <b>SEC 4.1</b><br>1 - Sellos CIAA por la cantidad de _____.<br>2 - Sellos de Rentas Internas por la cantidad de _____.                                    |
| (X) ( )            | ( )             | - Dos (2) copias de planos de localización "Layout Facilities", especificaciones de la fuente de emisión y sus medidas o equipo de control. <b>SEC 2.0</b>                              |
| (X) ( )            | ( )             | - Dos copias del presupuesto o estimado de costo de la fuente de emisión a contruirse, detalles y desglosado. <b>SEC 4.2</b>  |
| (X) ( )            | ( )             | - Evidencia de haber cumplido con el Artículo 4C de la Ley #9 del 18 de junio de 1970 (Ley de Política Pública Ambiental). <b>SEC 3.3</b>   |
| (X) ( )            | ( )             | - Dos copias de los calculos de emisiones. <b>SEC 1.7</b>   |
| (X) ( )            | ( )             | - Evidenciar copias de los Permisos de las Agencias gubernamentales que tienen jurisdicción sobre el caso. <b>SEC 3.3</b>   |

cm  
Técnico que recibe el documento  
(Para uso JCA)

Firma y Sello (Ingeniero o Arquitecto)



## Section 1.2

### Application Forms



Environmental  
Quality Board

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR  
Office of the Board: National Plaza Bldg., 431 Ponce de Leon Ave.  
Mailing Address: PO Box 11488, Santurce, PR 00910  
Tel: [725-5140] - [Ext. 222 or 227]

APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
OPERATION OF EMISSIONS SOURCES IN PUERTO RICO

PART I - GENERAL INFORMATION

☒ Original ☐ Revision No. \_\_\_\_\_ [Check One] Date: \_\_\_\_\_

1. Applicant

A. Name of project or emissions source Utilities Expansion Project, Pfizer Pharmaceuticals, Inc

B. Location: Road # 2 km 58.2 Barceloneta, PR 00617

C. Authorized representative for permit application coordination and correspondence:  
Pfizer Pharmaceuticals, Inc.  
Organization

Anthony J. Maddaluna General Manager (809) 846-4300  
Name Of Official Title Tel. No.

D. Postal Address: PO Box 628 Barceloneta 00617  
PO Box No. Municipality Zip Code

2. Purpose of application: ☒ Construction ☐ Operation [Check One]

3. Nature of Business: Pharmaceutical Industry

4. No. of employees at site: 1000

5. Annual production [any convenient unit]: 8,000 kW; 30,000 lb/hr Steam

6. Itinerary of normal operations: 24 7 12  
Hrs./Day Days/Wk. Mos./Yr.

7. If intermittent operation, frequency: N/A

8. Attach the following documents:

A. Location map of plant site [projected or existing] indicating neighboring fields and prominent points or structures.

B. Layout plan of all facilities [projected or existing] indicating clearly all emissions sources.

C. Plan and specification of the emission source and its control measures or equipment.

D. Information about any air sampling or monitoring equipment used, intended to be used or owned by applicant, including type, trade mark, method, operation schedule, etc.

9. List all approvals or denials granted by Federal, State or Local agencies for any structure, construction, permit for use or requested number, and sanitary permit.

Type of Permit	Issuing Agency	Identification No.	Date
Construction	Planning Board	PC-89-1-0636	June 1, 1989
Construction	Planning Board	89-07-A167-APE	March 14, 1989
Construction	Planning Board	72-0708	February 29, 1992
Construction	Planning Board	73-0063	August 3, 1972

10. Did facility exist, or was it lawfully under construction prior to September 16, 1971?

☐ Yes ☒ No [Check One]

CERTIFICATION

Application is hereby made for a permit to authorize the activities described herein. I certify that, to the best of my knowledge and belief, such information is true, complete and accurate.

[Signature]  
Signature of Applicant

AFFIDAVIT

Affidavit No.: 11477

Sworn and subscribed before me by Anthony J. Maddaluna responsible officer  
of legal age, civil status married  
and resident of Guaynabo, Puerto Rico  
In Barceloneta, Puerto Rico, this 17th day of June, 1996

[Signature]  
Notary Public

FOR ENVIRONMENTAL QUALITY BOARD USE ONLY

Permit issued on \_\_\_\_\_ Expires on \_\_\_\_\_ Applicant No. \_\_\_\_\_





Environmental  
Quality Board

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR  
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APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
OPERATION OF EMISSIONS SOURCES IN PUERTO RICO

PART II - PLANT PROCESS AND EMISSIONS DESCRIPTION

I. Industrial Emissions:

1. Describe process or operation that emits atmospheric contaminants.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Raw material used or processed:

Type	Quantity	Unit/Unit Time
_____	_____	_____
_____	_____	_____

3. Control equipment for emissions:

Type	Efficiency % by wt.	Height ft.	Exhaust Diam. in.	Exhaust Temp. °F	Exhaust Veloc. ft./sec.
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

4. Chimneys or stacks:

5. Volume of discharge emissions: \_\_\_\_\_ cu.ft./min.

6. Emissions: Actual Estimated-based on:  
Type of Pollutant Quantity [wt./unit time] Duration [time/unit time]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Attach process flow diagram [block type] showing points, amounts and types of emissions.

II. Emissions from combustion:

1. Combustion equipment: Diesel Generator I or 1,193  
Type BTU/hr. Horsepower

2. Fuel: Type Gals./hr. or Lbs./hr. % Sulfur  
Diesel @ 840,000 gal/yr. 112 0.2 %

3. Control equipment for emissions:

Type	Efficiency % by wt.	Height ft.	Exhaust Diam. in.	Exhaust Temp. °F	Exhaust Veloc. ft./sec.
Selective Catalytic Reduction	97 %	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

4. Chimneys or stacks:

III. Emissions from incinerator or waste disposal:

1. Method for disposal of wastes: \_\_\_\_\_

2. Wastes: Type Quantity lbs/day

3. Incinerator: type Trade Mark Capacity lbs/day

4. Chimney or stack: Height ft. Exh. Diam. in. Exh. Temp. °F Exh. Veloc. ft./sec.

5. Auxiliary fuel: Type Gals./hr. or Lbs./hr. % Sulfur

6. Control equipment: Type Efficiency % by wt.

- IV. Compliance: Attach data or information showing that emissions will not exceed the established limits.

- V. Control Equipment: Attach sketch of any control equipment installation at the emission source.

CERTIFICATION BY AN ENGINEER OR A CHEMIST

I Certify that I am registered and authorized to practice my profession in Puerto Rico, that the equipment and measures for the control of the emission are adequate and comply with the provisions of the Air Pollution Control regulation of Puerto Rico Environmental Quality Board and that, to the best of my knowledge and belief, the above information is true, complete and accurate.

8186  
License Number

Ramón Marrero  
Name [Typed]

Signature

Date 6/12/96

Applicant Number: \_\_\_\_\_



Environmental  
Quality Board

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR

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APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
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PART II - PLANT PROCESS AND EMISSIONS DESCRIPTION

I. Industrial Emissions:

1. Describe process or operation that emits atmospheric contaminants.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Raw material used or processed:

Type	Quantity	Unit/Unit Time
_____	_____	_____
_____	_____	_____
_____	_____	_____

3. Control equipment for emissions:

Type	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

4. Chimneys or stacks:

5. Volume of discharge emissions: \_\_\_\_\_ cu.ft./min.

6. Emissions: Actual Estimated-based on:  
Type of Pollutant Quantity [wt./unit time] Duration [time/unit time]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Attach process flow diagram [block type] showing points, amounts and types of emissions.

II. Emissions from combustion:

1. Combustion equipment: Diesel Generator II or 1,193  
Type BTU/hr. Horsepower

2. Fuel: Type Gals./hr. or Lbs./hr. % Sulfur  
Diesel @ 840,000 gal/yr. 112 0.2 %

3. Control equipment for emissions:

Type	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
Selective Catalytic Reduction	97 %	_____ ft.	_____ in.	_____ °F	_____ ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

4. Chimneys or stacks:

III. Emissions from incinerator or waste disposal:

1. Method for disposal of wastes:

2. Wastes: Type \_\_\_\_\_ Quantity \_\_\_\_\_ lbs/day

3. Incinerator: \_\_\_\_\_ lbs/day  
type Trade Mark Capacity

4. Chimney or stack: \_\_\_\_\_ ft. \_\_\_\_\_ in. \_\_\_\_\_ °F \_\_\_\_\_ ft./sec.  
Height Exh. Diam. Exh. Temp. Exh. Veloc.

5. Auxiliary fuel: \_\_\_\_\_ or \_\_\_\_\_  
Type Gals./hr. Lbs./hr. % Sulfur

6. Control equipment: \_\_\_\_\_ % by wt.  
Type Efficiency

- IV. Compliance: Attach data or information showing that emissions will not exceed the established limits.

- V. Control Equipment: Attach sketch of any control equipment installation at the emission source.

CERTIFICATION BY AN ENGINEER OR A CHEMIST

I Certify that I am registered and authorized to practice my profession in Puerto Rico; that the equipment and measures for the control of the emission are adequate and comply with the provisions of the Air Pollution Control regulation of Puerto Rico Environmental Quality Board and that, to the best of my knowledge and belief, the above information is true, complete and accurate.

8186  
License Number

Ramón Marrero  
Name [Typed]

Signature

Date 6/12/96

Applicant Number:



Environmental  
Quality Board

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR  
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APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
OPERATION OF EMISSIONS SOURCES IN PUERTO RICO

PART II - PLANT PROCESS AND EMISSIONS DESCRIPTION

I. Industrial Emissions:

1. Describe process or operation that emits atmospheric contaminants.

\_\_\_\_\_

\_\_\_\_\_

2. Raw material used or processed:

Type	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

5. Volume of discharge emissions: \_\_\_\_\_ cu.ft./min.

Emissions:	Actual	Estimated-based on:
Type of Pollutant	Quantity [wt./unit time]	Duration [time/unit time]
_____	_____	_____

7. Attach process flow diagram [block type] showing points, amounts and types of emissions.

II. Emissions from combustion:

Combustion equipment:	Type	BTU/hr.	or	1,193 Horsepower
Diesel Generator III	_____	_____	_____	_____

Fuel:	Type	Gals./hr.	or	Lbs./hr.	% Sulfur
Diesel @ 840,000 gal/yr.	_____	112	_____	_____	0.2 %

Control equipment for emissions:	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
Selective Catalytic Reduction	97 %	_____ ft.	_____ in.	_____ °F	_____ ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

III. Emissions from incinerator or waste disposal:

1. Method for disposal of wastes: \_\_\_\_\_

2. Wastes: Type \_\_\_\_\_ Quantity \_\_\_\_\_ lbs/day

3. Incinerator: \_\_\_\_\_ lbs/day

type	Trade Mark	Capacity
_____	_____	_____

4. Chimney or stack: \_\_\_\_\_ ft. \_\_\_\_\_ in. \_\_\_\_\_ °F \_\_\_\_\_ ft/sec.

Height	Exh. Diam.	Exh. Temp.	Exh. Veloc.
_____	_____	_____	_____

5. Auxiliary fuel: \_\_\_\_\_ or \_\_\_\_\_

Type	Gals./hr.	Lbs./hr.	% Sulfur
_____	_____	_____	_____

6. Control equipment: \_\_\_\_\_ % by wt.

Type	Efficiency
_____	_____

- IV. Compliance: Attach data or information showing that emissions will not exceed the established limits.

- V. Control Equipment: Attach sketch of any control equipment installation at the emission source.

CERTIFICATION BY AN ENGINEER OR A CHEMIST

I Certify that I am registered and authorized to practice my profession in Puerto Rico; that the equipment and measures for the control of the emission are adequate and comply with the provisions of the Air Pollution Control regulation of Puerto Rico Environmental Quality Board and that, to the best of my knowledge and belief, the above information is true, complete and accurate.

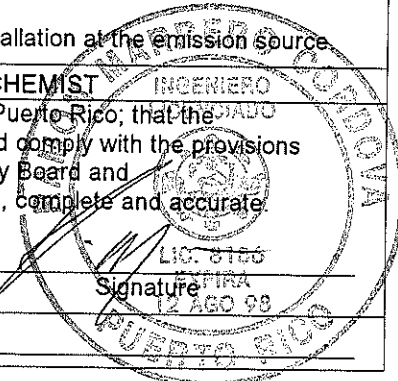
8186  
License Number

Ramón Marrero  
Name [Typed]

Signature

Date 6/12/96

Applicant Number: \_\_\_\_\_





Environmental  
Quality Board

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APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
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PART II - PLANT PROCESS AND EMISSIONS DESCRIPTION

I. Industrial Emissions:

1. Describe process or operation that emits atmospheric contaminants.

\_\_\_\_\_

\_\_\_\_\_

2. Raw material used or processed:

Type	Efficiency % by wt.	Height ft.	Exhaust Diam. in.	Exhaust Temp. °F	Exhaust Veloc. ft./sec.
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

5. Volume of discharge emissions:

\_\_\_\_\_ cu.ft./min.

6. Emissions: Actual Estimated-based on:

Type of Pollutant	Quantity [wt./unit time]	Duration [time/unit time]
_____	_____	_____
_____	_____	_____

7. Attach process flow diagram [block type] showing points, amounts and types of emissions.

II. Emissions from combustion:

1. Combustion equipment: Diesel Generator IV Type or 1,193 BTU/hr. Horsepower

2. Fuel: Diesel @ 840,000 gal/yr. Type Gals./hr. or Lbs./hr. % Sulfur  
112 0.2 %

3. Control equipment for emissions:

Type	Efficiency % by wt.	Height ft.	Exhaust Diam. in.	Exhaust Temp. °F	Exhaust Veloc. ft./sec.
Selective Catalytic Reduction	97 %	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

4. Chimneys or stacks:

III. Emissions from incinerator or waste disposal:

1. Method for disposal of wastes:

2. Wastes: Type \_\_\_\_\_ Quantity \_\_\_\_\_ lbs/day

3. Incinerator: \_\_\_\_\_ lbs/day

4. Chimney or stack: \_\_\_\_\_ ft. \_\_\_\_\_ in. \_\_\_\_\_ °F \_\_\_\_\_ ft/sec.  
Height Exh. Diam. Exh. Temp. Exh. Veloc.

5. Auxiliary fuel: \_\_\_\_\_ or \_\_\_\_\_ % Sulfur  
Type Gals./hr. Lbs./hr.

6. Control equipment: \_\_\_\_\_ % by wt.  
Type Efficiency

- IV. Compliance: Attach data or information showing that emissions will not exceed the established limits.

- V. Control Equipment: Attach sketch of any control equipment installation at the emission source.

CERTIFICATION BY AN ENGINEER OR A CHEMIST

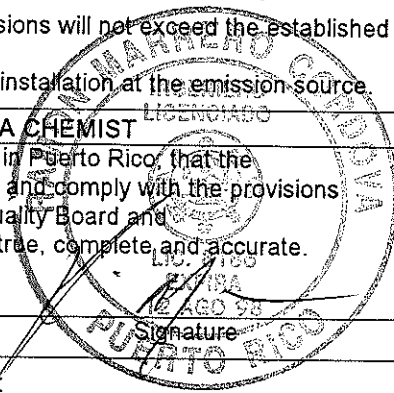
I Certify that I am registered and authorized to practice my profession in Puerto Rico, that the equipment and measures for the control of the emission are adequate and comply with the provisions of the Air Pollution Control regulation of Puerto Rico Environmental Quality Board and that, to the best of my knowledge and belief, the above information is true, complete and accurate.

8186  
License Number

Ramón Marrero  
Name [Typed]

Date 6/12/96

Applicant Number





COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR  
Office of the Board: National Plaza Bldg., 431 Ponce de Leon Ave.  
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Environmental  
Quality Board

APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
OPERATION OF EMISSIONS SOURCES IN PUERTO RICO

PART II - PLANT PROCESS AND EMISSIONS DESCRIPTION

I. Industrial Emissions:

1. Describe process or operation that emits atmospheric contaminants.

\_\_\_\_\_

\_\_\_\_\_

2. Raw material used or processed:

Type	Efficiency % by wt.	Height ft.	Type	Quantity	Unit/Unit Time
			4. Chimneys or stacks:		
			Exhaust	Exhaust	Exhaust
			Diam.	Temp.	Veloc.
			ft.	in.	ft./sec.
			ft.	in.	ft./sec.

5. Volume of discharge emissions: \_\_\_\_\_ cu.ft./min.

6. Emissions: Actual Estimated-based on:  
Type of Pollutant Quantity [wt./unit time] Duration [time/unit time]

\_\_\_\_\_

\_\_\_\_\_

7. Attach process flow diagram [block type] showing points, amounts and types of emissions.

II. Emissions from combustion:

1. Combustion equipment: Diesel Generator V or 1,193  
Type BTU/hr. Horsepower

2. Fuel: Type Gals./hr. or Lbs./hr. % Sulfur  
Diesel @ 840,000 gal/yr. 112 0.2 %

3. Control equipment for emissions: 4. Chimneys or stacks:
- | Type                | Efficiency<br>% by wt. | Height<br>ft. | Exhaust<br>Diam. | Exhaust<br>Temp. | Exhaust<br>Veloc. |
|---------------------|------------------------|---------------|------------------|------------------|-------------------|
| Selective Catalytic | 97 %                   | ft.           | in.              | °F               | ft./sec.          |
| Reduction           |                        | ft.           | in.              | °F               | ft./sec.          |

III. Emissions from incinerator or waste disposal:

1. Method for disposal of wastes: \_\_\_\_\_

2. Wastes: Type \_\_\_\_\_ Quantity \_\_\_\_\_ lbs/day

3. Incinerator: \_\_\_\_\_ lbs/day

4. Chimney or stack: type Trade Mark Capacity
- |        |     |            |     |            |    |             |          |
|--------|-----|------------|-----|------------|----|-------------|----------|
| Height | ft. | Exh. Diam. | in. | Exh. Temp. | °F | Exh. Veloc. | ft./sec. |
|--------|-----|------------|-----|------------|----|-------------|----------|

5. Auxiliary fuel: Type Gals./hr. or Lbs./hr. % Sulfur

6. Control equipment: \_\_\_\_\_ % by wt.
- Type Efficiency

- IV. Compliance: Attach data or information showing that emissions will not exceed the established limits.

- V. Control Equipment: Attach sketch of any control equipment installation at the emission source

CERTIFICATION BY AN ENGINEER OR A CHEMIST

I Certify that I am registered and authorized to practice my profession in Puerto Rico, that the equipment and measures for the control of the emission are adequate and comply with the provisions of the Air Pollution Control regulation of Puerto Rico Environmental Quality Board and that, to the best of my knowledge and belief, the above information is true, complete and accurate.

8186  
License Number

Ramón Marrero  
Name [Typed]

Signature

Date 6/12/96

Applicant Number: \_\_\_\_\_



COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR  
Office of the Board: National Plaza Bldg., 431 Ponce de Leon Ave.  
Mailing Address: PO Box 11488, Santurce, PR 00910  
Tel: [725-5140] - [Ext. 222 or 227]

Environmental  
Quality Board

APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
OPERATION OF EMISSIONS SOURCES IN PUERTO RICO

PART II - PLANT PROCESS AND EMISSIONS DESCRIPTION

I. Industrial Emissions:

1. Describe process or operation that emits atmospheric contaminants.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Raw material used or processed:

Type	Quantity	Unit/Unit Time
_____	_____	_____
_____	_____	_____
_____	_____	_____

3. Control equipment for emissions:

4. Chimneys or stacks:

Type	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

5. Volume of discharge emissions:

\_\_\_\_\_ cu.ft./min.

6. Emissions: Actual Estimated-based on:

Type of Pollutant	Quantity [wt./unit time]	Duration [time/unit time]
_____	_____	_____
_____	_____	_____

7. Attach process flow diagram [block type] showing points, amounts and types of emissions.

II. Emissions from combustion:

1. Combustion equipment: \_\_\_\_\_ Package Boiler \_\_\_\_\_ or \_\_\_\_\_  
Type BTU/hr. Horsepower

2. Fuel: \_\_\_\_\_ Type \_\_\_\_\_ Gals./hr. or Lbs./hr. % Sulfur  
Diesel @ 829,209 gal/yr. 278.1 0.2 %

3. Control equipment for emissions:

4. Chimneys or stacks:

Type	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
_____	_____	190 ft.	42 in.	300 °F	26 ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

III. Emissions from incinerator or waste disposal:

1. Method for disposal of wastes:

2. Wastes: Type \_\_\_\_\_ Quantity \_\_\_\_\_ lbs/day

3. Incinerator: \_\_\_\_\_ type \_\_\_\_\_ Trade Mark \_\_\_\_\_ Capacity \_\_\_\_\_ lbs/day

4. Chimney or stack: \_\_\_\_\_ ft. \_\_\_\_\_ in. \_\_\_\_\_ °F \_\_\_\_\_ ft./sec.  
Height Exh. Diam. Exh. Temp. Exh. Veloc.

5. Auxiliary fuel: \_\_\_\_\_ or \_\_\_\_\_  
Type Gals./hr. Lbs./hr. % Sulfur

6. Control equipment: \_\_\_\_\_ Type \_\_\_\_\_ Efficiency \_\_\_\_\_ % by wt.

- IV. Compliance: Attach data or information showing that emissions will not exceed the established limits.

- V. Control Equipment: Attach sketch of any control equipment installation at the emission source.

CERTIFICATION BY AN ENGINEER OR A CHEMIST

I Certify that I am registered and authorized to practice my profession in Puerto Rico; that the equipment and measures for the control of the emission are adequate and comply with the provisions of the Air Pollution Control regulation of Puerto Rico Environmental Quality Board and that, to the best of my knowledge and belief, the above information is true, complete and accurate.

8186  
License Number

Ramón Marrero  
Name [Typed]

Signature

Date 6/12/96

Applicant Number: \_\_\_\_\_



Environmental  
Quality Board

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR  
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APPLICATION FOR THE APPROVAL FOR THE CONSTRUCTION OR  
OPERATION OF EMISSIONS SOURCES IN PUERTO RICO

PART II - PLANT PROCESS AND EMISSIONS DESCRIPTION

I. Industrial Emissions:

1. Describe process or operation that emits atmospheric contaminants.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Raw material used or processed:

Type	Quantity	Unit/Unit Time
_____	_____	_____
_____	_____	_____
_____	_____	_____

3. Control equipment for emissions:

4. Chimneys or stacks:

Type	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

5. Volume of discharge emissions:

\_\_\_\_\_ cu.ft./min.

6. Emissions: Actual Estimated-based on:

Type of Pollutant	Quantity [wt./unit time]	Duration [time/unit time]
_____	_____	_____
_____	_____	_____

7. Attach process flow diagram [block type] showing points, amounts and types of emissions.

II. Emissions from combustion:

1. Combustion equipment: \_\_\_\_\_ Heat Recovery Boiler \_\_\_\_\_ or \_\_\_\_\_  
Type \_\_\_\_\_ BTU/hr. \_\_\_\_\_ Horsepower

2. Fuel: \_\_\_\_\_ Type \_\_\_\_\_ Gals./hr. or \_\_\_\_\_ Lbs./hr. \_\_\_\_\_ % Sulfur  
Diesel @ 604,844 gal/yr. 278.1 0.2 %

3. Control equipment for emissions:

4. Chimneys or stacks:

Type	Efficiency % by wt.	Height	Exhaust Diam.	Exhaust Temp.	Exhaust Veloc.
_____	_____	190 ft.	42 in.	300 °F	26 ft./sec.
_____	_____	_____ ft.	_____ in.	_____ °F	_____ ft./sec.

III. Emissions from incinerator or waste disposal:

1. Method for disposal of wastes: \_\_\_\_\_

2. Wastes: Type \_\_\_\_\_ Quantity \_\_\_\_\_ lbs/day

3. Incinerator: \_\_\_\_\_ lbs/day

4. Chimney or stack: \_\_\_\_\_ type \_\_\_\_\_ Trade Mark \_\_\_\_\_ Capacity \_\_\_\_\_  
\_\_\_\_\_ ft. \_\_\_\_\_ in. \_\_\_\_\_ °F \_\_\_\_\_ ft/sec.  
Height Exh. Diam. Exh. Temp. Exh. Veloc.

5. Auxiliary fuel: \_\_\_\_\_ or \_\_\_\_\_  
Type Gals./hr. Lbs./hr. % Sulfur

6. Control equipment: \_\_\_\_\_ % by wt.  
Type Efficiency

IV. Compliance: Attach data or information showing that emissions will not exceed the established limits.

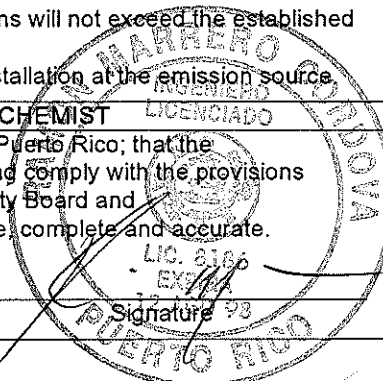
V. Control Equipment: Attach sketch of any control equipment installation at the emission source.

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8186  
License Number

Ramón Marrero  
Name [Typed]



Date 6/12/96

Applicant Number: \_\_\_\_\_



COMMONWEALTH OF PUERTO RICO/OFFICE OF THE GOVERNOR  
ENVIRONMENTAL QUALITY BOARD

AIR QUALITY AREA

**FEE FORM**

Application Number

Name of Applicant:

Title:

Name of Project or Emission Sources:

Postal Address:

PFE 09-0393-0282-I-II-III-0

Ramón Marrero

Ingeniero Ambiental

Pfizer Pharmaceuticals, Inc.

P.O. BOX 628

Barceloneta, PR 00617

I- Fees determined for permit application:

1. Filing Fee(\$100.00): ☒ Construction ☐ Operation ☐ Lead \$100.00  
☐ Asbestos Removal ☐ Asbestos Training School
2. ☐ Permit Fee 3. ☐ Renewal Fee 4. ☐ Modification Fee (\$10.00 per ton per pollutant)

Pollutant	Emissions (Tons/year)	Total Fee
<input type="checkbox"/> Particulate Matter (PM <sub>10</sub> and TSP)	12.3	123.7
<input type="checkbox"/> Sulfur Dioxide (SO <sub>x</sub> )	79.2	792.0
<input type="checkbox"/> Nitrogen Oxides (NO <sub>x</sub> )	61.1	611.0
<input type="checkbox"/> Lead (Pb)	0.0	0.0
<input type="checkbox"/> Volatile Organics Compounds (VOC) and Hydrocarbons	8.7	87.0
<input type="checkbox"/> Others(e.i. Berillium, Mercury, etc; please identify) CO	50.0	500.0
5. Asbestos Activities		
a. Removal Project Duration		
<input type="checkbox"/> From 1 to 30 days	\$ 175.00	
<input type="checkbox"/> From 31 to 90 days	\$ 450.00	
<input type="checkbox"/> From 91 up to 365 days	\$ 725.00	
b. Asbestos Training School	\$ 600.00	
c. Asbestos Registration	\$ 40.00 (for each category)	
<input type="checkbox"/> General Abatement Certification	<input type="checkbox"/> School Inspectors	
<input type="checkbox"/> School Management Planners	<input type="checkbox"/> Abatement Supervisors	
<input type="checkbox"/> Air Monitoring Specialist	<input type="checkbox"/> Abatement Workers	
<input type="checkbox"/> School Abatement Project Designers		

Sub-total \$2,113.70

6. Transfer of Ownership or Change of Location (50% of filing fee) \_\_\_\_\_
7. Revision Fee (50% of filing fee) \_\_\_\_\_
8. Duplicate Permits (\$10.00) \_\_\_\_\_
9. Excess Emission Fee
- a. Variance (\$25.00/ton/pollutant) \_\_\_\_\_
- b. Small Business (\$12.50/ton/pollutant) \_\_\_\_\_
10. Application Total Fees \$2,213.70
- II. Annual payment fee (permit fee for one year) \_\_\_\_\_
- III. Extra 4-year payment fee (permit fee for 4 years) \_\_\_\_\_

To be completed by the Air Program's Application Office

Fee Billing Amount: \_\_\_\_\_ Date: \_\_\_\_\_ Received: \_\_\_\_\_

Fee payments check no. \_\_\_\_\_ Voucher no. \_\_\_\_\_

Application's Recipient

Finance Division's Receptor

## **DESCRIPTION OF OPERATION FOR COGENERATION**

### **Section 1.4 Process Description**

#### **I-GENERAL**

The cogeneration system consists of five 1600KW diesel generators (DG's) and heat recovery systems initially with room and infrastructure for a sixth unit. The electricity generated will all be used on site with the facility remaining a net purchaser of approximately 3MW of electricity. The electrical system operation basis is described in paragraph 8.8.

In the event of the total loss of offsite power, the diesel generators have black start capability and will serve as emergency generators. Each DG is equipped with its own remote radiator to permit operation as a stand alone generator if the heat recovery systems happen to be off line.

#### **II-ENGINE EXHAUST SYSTEM**

The DG exhaust gases will pass through two SCR stages to reduce NO<sub>x</sub> emissions before entering the auxiliary fired combustion chamber. This combustion chamber resembles a refractory lined oven to achieve complete burn-out of soot and lube-oil carryover from the diesel engines. The burner is low-NO<sub>x</sub> type. The heated gases then pass into the Heat Recovery Steam Generator (HRSG) which is designed to produce 30,000 lb/hr of 150 PSIG steam. The (HRSG) is a drum type boiler with a full membrane furnace to prevent dew point corrosion.

The flue gas exits the boiler and passes through the economizer prior to entering on flue of the 190 Ft. tall three flue, free standing chimney.

The exhaust gases of the diesel engines can produce up to 10,000lb/hr of steam. The auxiliary burner can either produce the additional 20,000lb/hr or fire the boiler to 30,000lb/hr with no diesel engine exhaust heat.

#### **III-ENGINE JACKET WATER**

The engine jacket water heat is transferred to a circulating loop by plate and frame heat exchangers. The hot water (204F) powers two 400 ton single stage absorption chillers which precool the plant chilled water return prior to its entering the main chillers. The hot water loop is equipped with a steam booster heat exchanger which can heat the water to 240F prior to entering the absorption chillers.

This higher temperature increases the capacity of the absorption chillers to approximately 750 tons each. This mode of operation is primarily to balance steam system flows in the event here is an imbalance between electrical load and steam load. It can also be used to reduce electrical consumption in the main chillers by shifting load.

To protect the engines from high temperature returning from the loop, an auxiliary cooling tower water to cool the engines. This will not normally operate. It will also provide engine cooling if the absorption chillers are out of service.

#### **IV-EMISSION CONTROLS**

NOx emissions from the cogeneration system are controlled by two stages of Selective Catalytic Reduction (SCR) in which ammonia is sprayed into the DG exhaust gases which then pass through a zeolite catalyst that results in N<sub>2</sub> and water being formed.

Each DG has a first stage SCR which reduces NOx by approximately 90%. All the exhausts are then combined and pass through a single SCR unit that will remove approximately 80% of the remaining NOx.

SOx emissions are controlled by limited the sulfur content of the fuel.

VOC, CO and Particulate emissions are controlled by the auxiliary fired combustion chamber which will achieve complete burnout of these contaminants.

To verify compliance, continuous NOx emission monitoring (CEM) will be provided.

#### **V-BOILER AUXILIARIES**

In addition to the HRSG, a 30,000lb/hr package fire tube boiler will be installed complete with a low NOx burner. Exhaust gases from this boiler will go one of the other flues in the new stack.

Auxiliary systems that will be provided with the boilers include the dual head tray type deaerator/feedpump package, condensate return tank/pump package and make-up/chemical feed systems.

## **Section 1.5**

### **Facility and Process Layout**



**Pfizer** PHARMACEUTICALS, INC.  
BARCELONETA, PUERTO RICO

## SITE PLAN

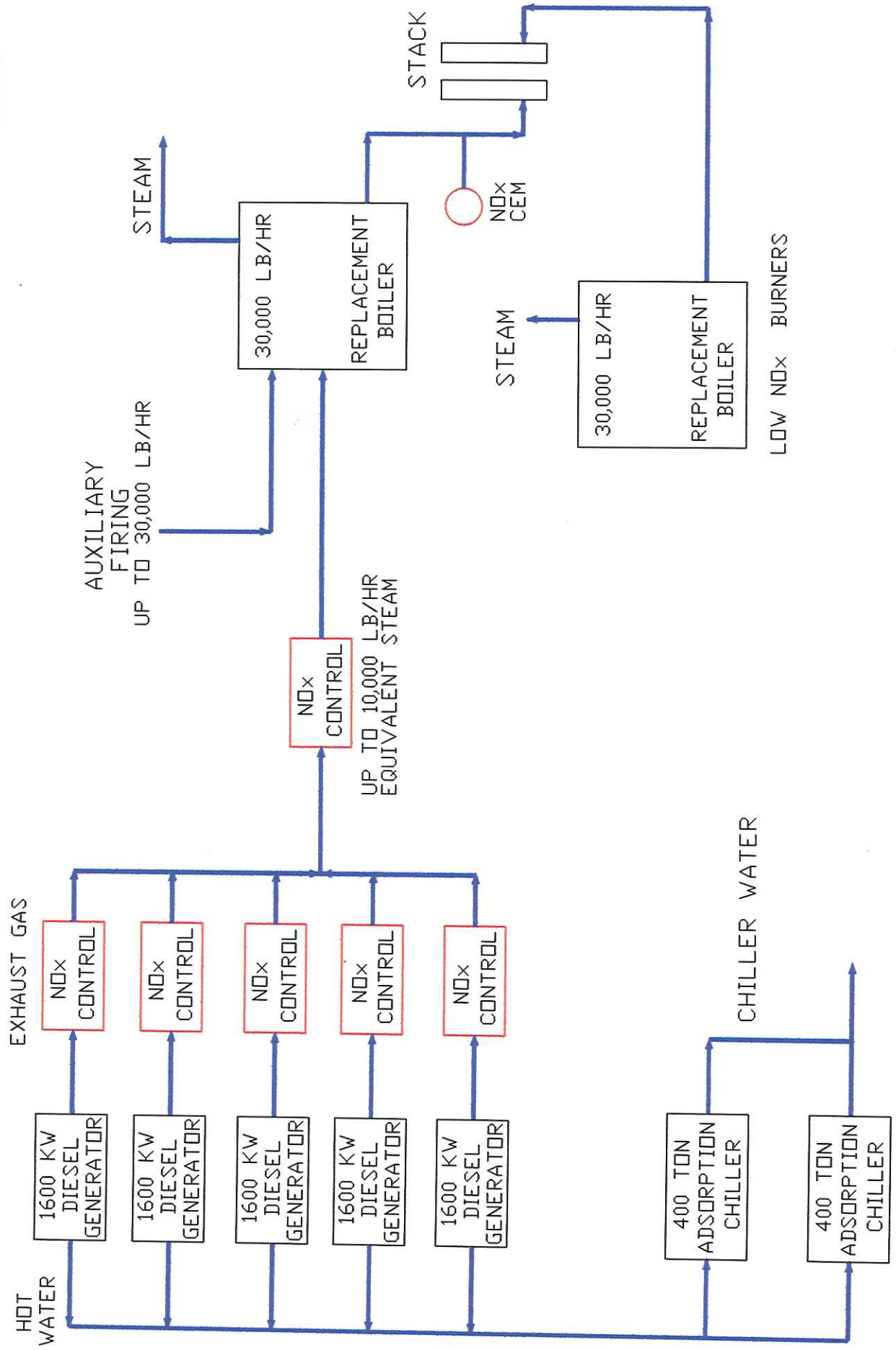
LEGEND:  
NEW BOILER EMERGENCY POWER (COGEN)

PROPERTY LINE & FENCE

STATE ROAD P.R. 2 (OCEAN MARGINAL)

STATE ROAD P.R. 2

# COGENERATION / EMERGENCY POWER - PPI



REC'D  
ATTA COUNCIL DE ARE  
1996 JUN 19 PM 2:58

## **Section 1.6**

### **Summary of Emissions and Limitations**

## Section 1.6 Summary of Emissions and Limitations

### Federal USEPA Determination of Net Emission Changes from the PPI Utility Plant Expansion Project

	(A)	(B)	(A-B)	
Pollutant	Future Potential Emissions <sup>(2)</sup> (tpy)	Actual Current Emissions <sup>(1)</sup> (tpy)	Net Change in Emissions (tpy)	USEPA Significant Emission Rates (tpy)
SO <sub>2</sub>	79.18	104.1	-24.89	40
NO <sub>x</sub>	61.09	25.66	35.43	40
CO	50.00	2.33	47.66	100
HC	8.69	0.13	8.56	40
PM	7.06	7.59	-0.53	25
PM-10	5.21	6.53	-1.32	15
Pb	0.00339	0.00788	-0.00456	0.6

Notes (1) and (2) See attached table 1.0 for details

### PREQB Location Approval Evaluation

	(A)	(B)	(A-B)	
Pollutant	Current Permitted Emissions <sup>(1)</sup> (tpy)	Future Potential Emissions (tpy)	Change in Permitted (tpy)	EQB Significant Rates (tpy)
SO <sub>2</sub>	304	79.18	-225	10
NO <sub>x</sub>	56.9	55.34	-1.56	10
CO	4.8	49.55	44.75	100
HC	1.0	8.63	7.63	10
PM	22.3	7.06	-15.24	10
PM-10	19.5	5.21	-14.29	
Pb	0.0176	0.00339	-0.0142	

Notes: (1) - Current permitted are based on maximum fuel usage in existing boilers with application of USEPA emission factors

## **Section 1.7**

### **Support Calculation for Emissions**



COMMONWEALTH OF PUERTO RICO/OFFICE OF THE GOVERNOR  
ENVIRONMENTAL QUALITY BOARD

AIR QUALITY AREA

FEE FORM

PFE-09-0696-0669-III

Application Number

Name of Applicant:

Title:

Name of Project or Emission Sources:

Postal Address:

PFE 09-0393-0282-I-II-III-0

Ramón Marrero

Ingeniero Ambiental

Pfizer Pharmaceuticals, Inc.

P.O. BOX 628

Barceloneta, PR 00617

EA94-0039(CFI)

CASO 94-267

DADA-2809-94

I- Fees determined for permit application:

1. Filing Fee(\$100.00): ☒ Construction ☐ Operation ☐ Lead \$100.00  
☐ Asbestos Removal ☐ Asbestos Training School  
2. ☐ Permit Fee 3. ☐ Renewal Fee 4. ☐ Modification Fee (\$10.00 per ton per pollutant)

Pollutant	Emissions (Tons/year)	Total Fee
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b. Asbestos Training School	\$ 600.00	
c. Asbestos Registration	\$ 40.00 (for each category)	
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<input type="checkbox"/> School Management Planners	<input type="checkbox"/> Abatement Supervisors	
<input type="checkbox"/> Air Monitoring Specialist	<input type="checkbox"/> Abatement Workers	
<input type="checkbox"/> School Abatement Project Designers		

Sub-total \$2,113.70

6. Transfer of Ownership or Change of Location (50% of filing fee)  
7. Revision Fee (50% of filing fee)  
8. Duplicate Permits (\$10.00)  
9. Excess Emission Fee  
a. Variance (\$25.00/ton/pollutant)  
b. Small Business (\$12.50/ton/pollutant)

10. Application Total Fees

II. Annual payment fee (permit fee for one year)

\$2,213.70

III. Extra 4-year payment fee (permit fee for 4 years)

To be completed by the Air Program's Application Office

Fee Billing Amount: 2,213.70

Date: 18 June 96

Received: com

Fee payments check no. 079832

Voucher no. 604377

Application's Recipient

Finance Division's Receiver

## **Section 1.3**

### **Project Background**

### Section 1.3 Project Background

The existing utility plant at the PPI facility consists of two Superior boilers rated at 16.7 MMBtu/hr heat input each with a maximum steam producing capacity of 13,800 lb./hr each. The boilers were installed in 1972 and are permitted to burn residual fuel oil with a maximum sulfur content of 2.01%. The facility's electric needs have been met by purchasing power from PREPA.

Preliminary engineering for this project began in 1993. Although the two existing boilers were able to satisfy the average steam demand of the facility, it became apparent around that time that peak steam demand would exceed the boiler capacity in the near term future. A significant portion of the current and future demand is for solvent recovery and other waste minimization and pollution control projects (e.g. wastewater steam stripping). In addition to the steam required for waste minimization and pollution control projects, increased production at PPI will demand more steam. Future total connected steam load of is projected to be approximately 38,000 lb./hr. Expansion of the utility plant is required to meet this future steam demand. In addition, there is currently no backup steam capacity which is becoming a significant concern given the age of the existing boilers.

The developed utility plant expansion project consists of decommissioning and removing the two existing Superior boilers and installing five 1,600 KW diesel engine electric generators (originally five 1,500 KW engines were planned) which will burn low sulfur (0.2 percent) fuel oil. Each individual engine will be equipped with a Selective Catalytic Reduction (SCR) unit for NO<sub>x</sub> control. The exhaust from these individual engine/SCR units will then be ducted to a common SCR unit. An overall reduction in NO<sub>x</sub> emissions of 97.5 percent is expected to be achieved using this dual SCR configuration. PPI plan is to operate, when needed and when cost effective, the diesels simultaneously to produce a total of 8,000 KW of electricity. PPI will maintain a connection to PREPA. Exhaust gas from the diesel engines will be used to produce steam in the heat recovery steam generator (HRSG). The HRSG will have a total steam generating capacity of 30,000 lb./hr of which up to 15,800 lb./hr will be generated from the diesel engine exhaust with the remainder generated by supplemental firing of low sulfur (0.2 percent) fuel oil. The HRSG will incorporate a low-NO<sub>x</sub> burner and NO<sub>x</sub> emissions from the HRSG (which includes treated exhaust from the diesel engines) will be continuously monitored. A package boiler will also be installed with a total steam capacity of 30,000 lb./hr generated and will burn only low sulfur (0.2 percent) fuel oil. Like the HRSG, the package boiler will incorporate a low-NO<sub>x</sub> burner. All flue gas emissions will be discharge from a 190 ft stack to assure lowest groundlevel impacts possible. PPI has set a cap on combined fuel use on the new boiler, HRSG and engines to achieve the emission limitations. See Section 1.6 for a summary of projected emissions. The facility will restrict fuel oil combustion to 5,634,053 → gallons per year to achieve the emission limitations indicated in the emission summary table (see condition 1 USEPA's PSD Non-Applicability Determination in Section 3.1).

An initial meeting with EQB was held in May of 1993. At that meeting EQB suggested that PPI obtain concurrence from USEPA that the project was not subject to Prevention of Significant Deterioration of Air Quality (PSD) Permitting Requirements. PPI submitted

an initial request for a PSD Non-Applicability Determination to USEPA on April 20, 1994. A minor change in project scope during the course of detailed design necessitated a supplemental request in May of 1995 which included revised emission calculations and additional information requested by EPA. On November 30, 1995 after a detailed review of our emission calculations and a request by PPI to revise proposed construction permit conditions to reflect the use of a CEM for NOx emissions EPA granted a determination that that the project is not subject to PSD permitting. The determination was conditioned on EQB's incorporation of EPA's suggested construction permit conditions. EPA's non-applicability determination with the suggested construction permit conditions are included in Section 3.1 of the application document.

**Section 1.4**  
**Process Description**

# PPI Cgeneration Project- B113 Expansion

**Table 1. Applicable emission factor for specific criteria air pollutants.**

Equipment	Capacity KW	Fuel Type	Fuel		Emission Factors, lb / thousand gal						
			% S	Consumption gal / yr	NOx	SOx	CO	HC	PM	PM 10	Pb
Cogenerator I	1600	Diesel	0.2	840,000	20.37 *	28.01	22.10	4.07	2.68	2.14	0.00120
Cogenerator II	1600	Diesel	0.2	840,000	20.37 *	28.01	22.10	4.07	2.68	2.14	0.00120
Cogenerator III	1600	Diesel	0.2	840,000	20.37 *	28.01	22.10	4.07	2.68	2.14	0.00120
Cogenerator IV	1600	Diesel	0.2	840,000	20.37 *	28.01	22.10	4.07	2.68	2.14	0.00120
Cogenerator V	1600	Diesel	0.2	840,000	20.37 *	28.01	22.10	4.07	2.68	2.14	0.00120
Package Boiler		Diesel	0.2	829,209	34.24	28.40	5.00	0.20	2.00	1.00	0.00120
HR Boiler		Diesel	0.2	604,844	13.60	28.40	5.00	0.20	2.00	1.00	0.00120

(\*) Combined factor - 17.64 associated to diesel combustion + 2.73 associated to ammonia leak into the system.

**Table 2. Summary of annual air emissions for selected air pollutants.**

[illegible]

**PPI Existing Boilers- B113**

**Table 1. Applicable emission factor for specific criteria air pollutants.**

Equipment	Capacity BTU/YR	Fuel Type	Fuel Consumption gal / yr	% S	Emission Factors, lb / thousand gal						
					NOx	SOx	CO	HC	PM	PM 10	Pb
Boiler 1	7.04E+10	Diesel	466,486	0.2	55.00	223.10	5.00	0.28	16.28	14.00	0.01690
Boiler 2	7.04E+10	Diesel	466,486	0.2	55.00	223.10	5.00	0.28	16.28	14.00	0.01690

Table 2. Summary of annual air emissions for selected air pollutants.

[illegible]

## Actual vs Expansion Emissions

Comparison of actual vs proposed scenarios.

Equipment	Capacity KW	Fuel Type	% S	Fuel Consumption gal / yr	Emissions, Tons / year				
					NOx	SOx	CO	HC	PM
Proposed Expansion	1600	Diesel	0.2	5,634,053	61.09	79.18	50.00	8.69	7.06
Existing Boilers	1600	Diesel	0.2	932,972	25.66	104.07	2.33	0.13	7.59
Net Increase					35.43	(24.89)	47.66	8.56	(0.53)
									(1.32)
									(0.005)
PSD de minimis level					40.00	40.00	100.00	25.00	15.00
									0.600

## DETERMINATION OF NO<sub>x</sub> Emissions FACTOR FOR DIESEL ENGINE

"Not to Exceed" NO<sub>x</sub> Emissions Rate at 100% Engine Load (1) 79.01 lb/hr  
Fuel Rate at 100% Engine Load (1) 112.0 gal/hr  
Destruction of Engine-Generated NO<sub>x</sub> in Two-stage SCR Unit 97.0 %

$$\text{Engine NO}_x \text{ Emission Factor} = \frac{79.01 \text{ lb/hr} \times 1000 \text{ gal}}{112. \text{ gal/hr}} = 705.4 \text{ lb NO}_x/1000 \text{ gal. fuel}$$

$$\text{NO}_x \text{ Emission Factor After Controls} = 706.4 \text{ lb} \times \frac{(100-97.5)}{100} = 17.64 \text{ lb NO}_x/1000 \text{ gal F}$$

Notes:

- (1) - NO<sub>x</sub> emissions rate and fuel rate determined from Caterpillar engine performance data.  
(2) - 97.5% NO<sub>x</sub> destruction assumed for emissions calculations. SCR vendor is guaranteeing 99% destruction.

## **PPI UTILITY EXPANSION - LEAD EMISSION FACTORS**

Boilers - #2 fuel oil-factors from ENSR - 2/7/94

$$(8.9 \text{ lbs}/10^{12} \text{ BTU}) \times 135,000 \text{ btu/gal} \times 1000 \text{ gallons} = 0.001202 \text{ lbs}/1000 \text{ gal}$$

Engines - #2 fuel oil - from ENSR 2/7/94

$$(8.9) \text{ lbs}/10^{12} \text{ BTU}) \times 135,000 \text{ btu/gal} \times 1000 \text{ gallons} = 0.001202 \text{ lbs}/1000 \text{ gal}$$

Existing Boilers - # 6 fuel oil

#6 fuel oil - lead range (28-194 lbs/10<sup>12</sup> BTU) used 111 lbs--from ENSR 2/7/94

$$(111 \text{ lbs}/10^{12} \text{ BTU}) \times 153000 \text{ btu/gal} \times 1000 \text{ gallons} = 0.016983 \text{ lbs}/1000 \text{ gal}$$

## **Section 1.8**

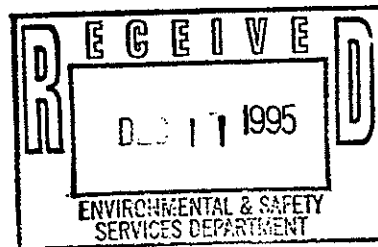
### **Description of SCR Nox Control Equipment**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 2  
290 BROADWAY  
NEW YORK, NY 10007-1866

NOV 30 1995

Carlos Lopez  
Manager of Environment, Health, and Safety  
Pfizer Pharmaceuticals, Inc.  
P.O. Box 628  
Barceloneta, Puerto Rico 00617



Re: Prevention of Significant Deterioration of Air Quality (PSD)  
Non Applicability Determination  
Pfizer Pharmaceutical, Inc.'s Utility Plant Expansion

Dear Mr. Lopez:

The U.S. Environmental Protection Agency (EPA), Region II Office, has completed its review of Pfizer Pharmaceutical, Inc.'s ("Pfizer's") November 15, 1995 request to revise several of EPA's proposed conditions that need to be added to PREQB's permit to construct. In your November 15 letter, Pfizer proposes to construct and operate one CEM to monitor the combined emissions of the 5 diesel engines and the HRSG boiler. In addition, the emission factors for the diesel engines and HRSG boiler have been modified. In the adjusted emission factors, the NOx contribution from the SCR ammonia leakage is assigned to the diesel engines instead of the HRSG boiler. Therefore, now that there is less disparity for the emission factors of each unit, Pfizer has requested that the individual fuel limits be deleted as conditions in the PREQB permit to construct.

EPA agrees with the new formula to calculate emissions based on one CEM measuring emissions from the 5 diesel engines and HRSG boiler. However, EPA does not necessarily believe that emissions from ammonia slip need to be added to the emission factors for either the diesel engines or HRSG boiler given that most of the ammonia slip will convert to Nitrogen in the HRSG boiler. However, by using the worst-case emission factors, EPA agrees that the information provided by Pfizer indicate preliminarily that Pfizer is not subject to PSD. In addition, EPA agrees with most of Pfizer's revised permit conditions. Attachment A contains the new conditions for PREQB's permit to construct.

The following explains some of the modifications EPA made to the conditions suggested by Pfizer in your November 15 letter. First, EPA modified the emission factor for the HRSG boiler in the condition regarding the initial stack test of the boilers. Second, EPA added a condition requiring that the diesel engines could only be operable if a primary SCR is on line. Finally, EPA

( disagrees with the new condition requested by Pfizer to use the emission factors and fuel usage to account for emissions when the CEM is down. EPA, instead, has added a condition that would require substitute CEM data be used on days the CEM is not on-line.

As stated in our July 7, 1995 preliminary determination that Pfizer's utility plant expansion is not subject to PSD, EPA will continue to review this project and make a final PSD non-applicability determination upon receipt of PREQB's final permit to construct containing the attached permit conditions.

If you have any questions concerning this correspondence, please contact Christine Fazio of my office at (212) 637-4015.

Sincerely yours,

A handwritten signature in dark ink, appearing to read 'Ken Eng', written over a horizontal line.

Kenneth Eng, Chief  
Air Compliance Branch

Attachment

( cc: Francisco Claudio  
Puerto Rico Environmental Quality Board

Natalie S. Ricciardi  
Pfizer Pharmaceuticals, Inc.

Mike Mahoney  
Pfizer Inc.

**Attachment**  
**Conditions To Be Included in PREQB Permit to Construct**

Pfizer Pharmaceutical, Inc. plans to expand its utility plant by installing five Caterpillar diesel engine electric generators rated at 1600 KW each; one supplemental fired heat recovery steam generator (HRSG) [with a total steam capacity of 30,000 lb/hr] which extracts heat from the diesel engine's exhaust; and one package boiler [with a total steam capacity of 30,000 lb/hr]. Two existing Superior boilers [each with a maximum steam capacity of 13,800 lb/hr] will be decommissioned and removed. The following conditions must be included in the PREQB permit to construct in order for Pfizer not to be subject to PSD.

1. Fuel usage at the utility is restricted to No. 2 fuel oil or diesel fuel. The total utility consumption shall not exceed 5,634,053 gallons/year per any period of 365 consecutive days. The sulfur content of the fuel combusted must not exceed 0.2 percent (0.2%) by weight.
2. Pfizer will demonstrate to PREQB and EPA that NOx emissions from the five engines and the HRSG and package boilers for any consecutive 365 days do not exceed 56 tons on the basis of the following formula:

$$(\text{Total NOx from Engines and HRSG}) + (\text{Total NOx from PB}) \leq 56 \text{ tons}$$

Where:

Total NOx from Engines and HRSG will be monitored through a single CEM at the common stack. The NOx which will be recorded in lbs/hr by the CEM system will be tracked as total pounds over a rolling 365 day period.

Total NOx from PB (package boiler) is determined by the manufacturer's guaranteed emission factor and fuel usage (Package boiler total gallons consumed x 13.6 lb NOx/1000 gallons). The total gallons consumed is over a rolling 365 day period.

3. Gallons for any 365 consecutive days shall be calculated by adding the daily fuel usage from the unit(s) to the total fuel usage from the unit(s) during the preceding 364 calendar days.
4. After start-up of the entire new utility plant, the two existing Superior boilers shall be shut down and dismantled. The PREQB permits for these two boilers shall be revoked and, at such time, PREQB will delete the boilers from its emissions inventory. Pfizer shall notify EPA when this condition is invoked.
5. In the event that the package boiler becomes fully operational prior to the 5 diesel engines and HRSG boiler, only one of the existing 16.7 MMBTU/hr heat input Superior boilers can operate at any one time. During this time, the

NOx emissions rate for the Superior boilers combined shall not exceed 13 tpy for any 365 consecutive day period. During this initial 365 consecutive days fuel use period, the package boiler may consume up to 2,270,000 gallons of fuel. Pfizer will use the following formula to show that NOx emissions during any consecutive 365 day period do not exceed 43 tons (excluding emissions from the operation of the Superior boilers):

$$(\text{Total NOx from Engines and HRSG}) + (\text{Total NOx from PB}) \leq 43 \text{ tons of NOx}$$

Where:

Total NOx from Engines and HRSG will be monitored through a single CEM at the common stack. The NOx which will be recorded in lbs/hr by the CEM system will be tracked as total pounds over a rolling 365 day period.

Total NOx from PB (package boiler) is determined by the manufacturer's guaranteed emission factor and fuel usage (Package boiler total gallons consumed x 13.6 lb NOx/1000 gallons). The total gallons consumed is over a rolling 365 day period.

This condition expires upon start-up of the entire new utility plant. Pfizer shall notify PREQB and EPA in writing when this condition has expired.

6. Pfizer shall install and maintain dual Selective Catalytic Reduction (SCR) control equipment for the five diesel engines. Each individual engine will be equipped with an SCR unit and the exhaust from the individual engine/SCR units will be ducted to a second stage SCR. Pfizer shall perform a stack test, within 180 days of start-up, of the five diesel engines/dual SCR at maximum rated capacity to verify that the NOx removal efficiency of the dual SCR control is at least 97.5%.
7. No diesel engine shall operate without a primary SCR unit on line (except during the initial 5 minutes of hot engine start-up or initial 30 minutes of cold engine start-up or final 10 minutes of engine shutdown).
8. Pfizer will monitor NOx from the engines and HRSG boiler through the use of continuous emission monitoring at the exhaust of the HRSG unit. Emissions for any 365 consecutive days shall be calculated by adding the daily NOx emissions from the five engines and HRSG boiler to the total NOx emissions during the preceding 364 calendar days.
9. The continuous emissions monitoring system (CEM) shall be on-line and operational during 95% of the time when the engines and/or HRSG boiler are operating. Pfizer shall measure NOx emissions, flow rate, and the proper diluents for converting NOx emissions measured by the CEM from parts

per million (ppm) to lb/hour. Pfizer shall properly calibrate, maintain and operate the CEM.

10. Low NOx burner technology shall be installed on the HRSG boiler and the package boiler.
11. The NOx emission factors provided by Pfizer for the HRSG boiler (20.4 lbs/1000 gal) and the package boiler (13.6 lbs/1000 gal) shall be verified through a stack test within 180 days of start-up of the new utility using EPA approved methodologies.
12. If in the event that the CEM is not fully operable during the initial period of system start-up (180 days), then Pfizer shall substitute the CEM data collected from the first month of full operation for each of the months the CEM was not in full operation. After this initial 180 day period, in the event that the CEM malfunctions or is not operable, Pfizer shall use as a substitute for each day the CEM is inoperable, the average of the three highest NOx values recorded by the CEM during normal peak operation from the 364 previous days.
13. Each of the five diesel engines, the HRSG boiler, and the package boiler shall be equipped with operable fuel meters that must be maintained and calibrated in accordance with the manufacturers' recommendations.
14. Pfizer shall record in a logbook the hours of operation; the fuel usage of the 5 diesel engines, the HRSG boiler, and the package boiler; and the results of any calculations for the formulas in Conditions #2 and #5 on a daily basis.
15. Pfizer shall continue to submit sulfur-in-fuel reports to the PREQB on a monthly basis, as required by Rule 410 of the Puerto Rico Regulations for the Control of Atmospheric Pollution.
16. All exceedances of the fuel limits or emission limitations established for the diesel engines and the boilers shall be reported to the PREQB and EPA in writing within 30 days of their occurrence.
17. All continuous monitoring records and logbooks required shall be maintained for a period of five years from the date of recording and shall be made available for inspection by PREQB and EPA personnel upon request.
18. In accordance with 40 CFR §52.21(r)(4), relaxation of any of the above conditions or restrictions may subject the source or modification to PSD as though construction had not yet commenced on the source or modification.

Buy a  
small fan  
in back up

I have  
this on it.

19. Pfizer shall comply with the New Source Performance Standards for Small Industrial-Commercial-Institutional Steam Generating Units found at 40 CFR Part 60 Subpart Dc and the General Provisions of 40 CFR Part 60 Subpart A for the HRSG and package boilers.

## **Section 2.0**

### **Facility Location Map and Detaile Process Layout**

The image is a topographic map of a region along the border of Florida and Arizona. A specific area is highlighted with a blue outline and labeled "PREDIO ACTUAL DE PFIZER". The map shows contour lines indicating elevation, with green shading representing higher terrain. Various roads and landmarks are marked, including "Cerro Danta" and "Cerro Maguay". The word "FLORIDA" is printed across the bottom of the map, and "ARIZONA" is partially visible on the right side. The map also includes a scale bar and a north arrow.



**GOBIERNO DE PUERTO RICO  
OFICINA DEL GOBERNADOR  
JUNTA DE CALIDAD AMBIENTAL**

**ASESORAMIENTO CIENTIFICO**

Fecha: 18/Junio/94

Núm. Control: 96-798

Permiso Fuente de Emisión  
(PFE)

**CERTIFICACION DE DOCUMENTO AMBIENTAL**

Referencia:

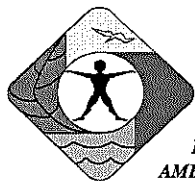
EA 94-0039 (CFI)  
Pfizer Pharmaceutical Inc.  
Expansión de utilidades  
Barceloneta, P.R.

Certificamos que el proyecto de referencia ha cumplido con los requisitos del Artículo 4(C) de la Ley Número 9 sobre Política Pública Ambiental.

Recibido por

[Signature]

[Signature]  
Firma



JUNTA  
DE CALIDAD  
AMBIENTAL

## GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR

### CONDICIONES

- 1- El combustible a utilizarse en todas las utilidades estará restringido a combustible líquido Número 2 (diesel) y el contenido de azufre en el combustible no podrá exceder de 0.2 por ciento ( 0.2 %) por peso. El consumo total de combustible en todas las utilidades no excederá de 5,634,053 galones por año en cualquier periodo consecutivo de 365 días.
- 2- Pfizer demostrará a la Junta de Calidad Ambiental (JCA) y a la Agencia de Protección Ambiental (APA) que las emisiones de  $\text{NO}_x$  de los cinco motores diesel de 1600KW, de la Caldera HRSG y de "Package Boiler" no excederán de 56 toneladas en cualquier periodo consecutivo de 365 días basándose en la siguiente fórmula:

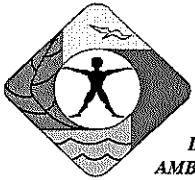
$$(\text{Total NO}_x \text{ de Motores 1600KW y HRSG}) + (\text{Total NO}_x \text{ de PB}) < 56 \text{ tons}$$

Dónde:

El total de  $\text{NO}_x$  de los motores y el HRSG será monitoreado en la chimenea común con un CEM. El  $\text{NO}_x$  que se registrará en libras por hora por el sistema del CEM será registrado como libras totales en un periodo rotativo de 365 días.

El total de  $\text{NO}_x$  del PB será determinado por el factor de emisión garantizado por el manufacturero y el consumo de combustible (Total de galones consumidos por PB x 13.6 lbs $\text{NO}_x$ /1000 galones). El total de galones consumidos será computado sobre un periodo rotativo de 365 días.

- 3- El galonaje, para cualquier periodo de 365 días, se calculará añadiendo el consumo de combustible diario de la unidad(es) al total de combustible consumido por la unidad(es) durante los 364 días anteriores.
- 4- Después del encendido inicial de la nueva planta de utilidades, las dos calderas (Superior) existentes tendrán que ser apagadas y desmanteladas. Los permisos de operación para esas dos calderas serán revocados y a la vez la Junta eliminará estas calderas de su inventario de emisiones. Pfizer notificará a APA cuando esta condición sea ejecutada.
- 5- Si el package boiler estuviera en completa operación antes que los cinco motores diesel y la caldera HRSG, se permitirá la operación de una de las calderas existentes (Superior) en cualquier momento. Durante este periodo las emisiones de  $\text{NO}_x$  de las calderas Superior combinadas no podrá exceder de 13 toneladas por año en cualquier periodo consecutivo de 365 días. En este periodo inicial de 365 días consecutivos, la caldera PB podrá consumir hasta 2,270,000 galones de combustible. Pfizer deberá utilizar la siguiente fórmula para demostrar que no excederán de 43 toneladas (excluyendo las emisiones de la operación de las calderas Superior):



## GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR

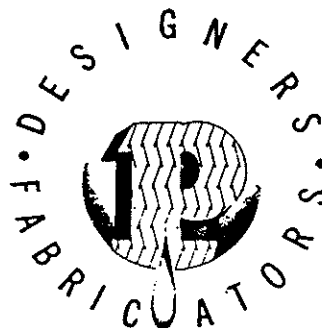
- 11- Los factores de emisión provistos por Pfizer para la caldera HRSG (20.4 lbs/1000gal) y el PB (13.6 lbs/1000gal) deberán ser verificados por medio de un muestreo de chimenea que deberá realizarse 180 después del encendido inicial de las nuevas utilidades. Utilizarán metodología aprobada por APA.
- 12- En caso de que el CEM no este operando completamente en el periodo inicial del encendido del sistema (180 días), Pfizer deberá sustituir la data recolectada por el CEM en el primer mes de operación completa por cada uno de los meses en que el CEM no estuvo en operación completa. Después de este periodo inicial de 180 días, si ocurriese un malfuncionamiento en el CEM o no estuviera operable, Pfizer deberá sustituir cada día en que el CEM no este en funcionamiento por el promedio de los tres valores más altos registrados por el CEM durante el pico normal de operación en los 364 días anteriores.
- 13- Deberá instalarse un medidor de flujo a cada uno de los motores diesel, a la caldera HRSG, y a el PB que deberá ser mantenido y calibrado de acuerdo con las recomendaciones del fabricante.
- 14- Pfizer deberá mantener un registro en el que incluya las horas de operación y el consumo de combustible de los cinco motores diesel, la caldera HRSG y el PB. Además deberá incluir los resultados de cualquier cálculo para las fórmulas establecidas en las condiciones #2 y #5 en una base diaria.
- 15- Pfizer deberá continuar enviando a la JCA los informes mensuales de contenido de azufre, tal como lo requiere la Regla 410 del Reglamento Para el Control de la Contaminación Atmosférica de Puerto Rico.
- 16- Deberá reportar por escrito a la JCA y EPA toda excedencia en los límites de combustible o en los límites de emisiones establecidos para los motores diesel y las calderas en un periodo no mayor de treinta días desde su ocurrencia.
- 17- Todos los registros de monitoreo y las bitácoras deben ser mantenidos por un periodo de cinco (5) años desde la fecha de registro. Estos registros deberán estar disponible para inspección de ser requeridos por personal de la JCA y APA.
- 18- De acuerdo con el 40 CFR 52.21 (r) (4) incumplir con cualquiera de las condiciones o restricciones antes mencionada puede hacer que la fuente o modificación este sujeta a PSD como si la construcción o modificación no hubiese comenzado todavía.
- 19- Pfizer deberá cumplir con los Estandares de Funcionamiento de Fuentes Nuevas (New Sources Performance Standards) para Unidades de Generación de Vapor Industriales-Comerciales-Institucionales que se encuentran en el Tomo 40 del Código de Regulaciones



**GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR**

Federales (CFR), Parte 60 Subparte Dc. Además deberá cumplir con el 40CFR Parte 60, Subparte A para la Caldera HRSG y el PB.

PEERLESS MFG. CO.



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**ENGINEERING OF AMMONIA INJECTION GRIDS  
USED IN  
SELECTIVE CATALYTIC REDUCTION SYSTEMS**

Kenneth J. Fewel, PE  
*Manager*  
Corporate Engineering Services

John H. Conroy  
*Manager of Engineering*  
SCR Systems Division

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**ABSTRACT**

Selective catalytic reduction (SCR) systems require the use of ammonia ( $\text{NH}_3$ ) as a reducing agent to react with nitrogen oxide compounds ( $\text{NO}_x$ ) in exhaust gases.  $\text{NO}_x$  emissions are thus reduced to harmless nitrogen and water vapor before release into the atmosphere. A catalyst is required for the reduction reactions to occur in a short period of time. In order to get the most complete reduction of  $\text{NO}_x$  compounds, the catalyst requires an even distribution of flow and ammonia concentration in the exhaust gas stream.

This paper outlines engineering techniques required for the most efficient design of the ammonia injection grid (AIG) and the exhaust gas mixing chamber to achieve optimum  $\text{NO}_x$  reduction with minimum ammonia slip and pressure drop. These methods include theoretical, empirical, and computational (finite difference) fluid dynamics techniques.

Appearing November 29, 1993 in  
*Oil & Gas Journal!*  
Special Issue on Refining and the Environment!

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**SPECIALISTS IN SELECTIVE CATALYTIC REDUCTION SYSTEMS**

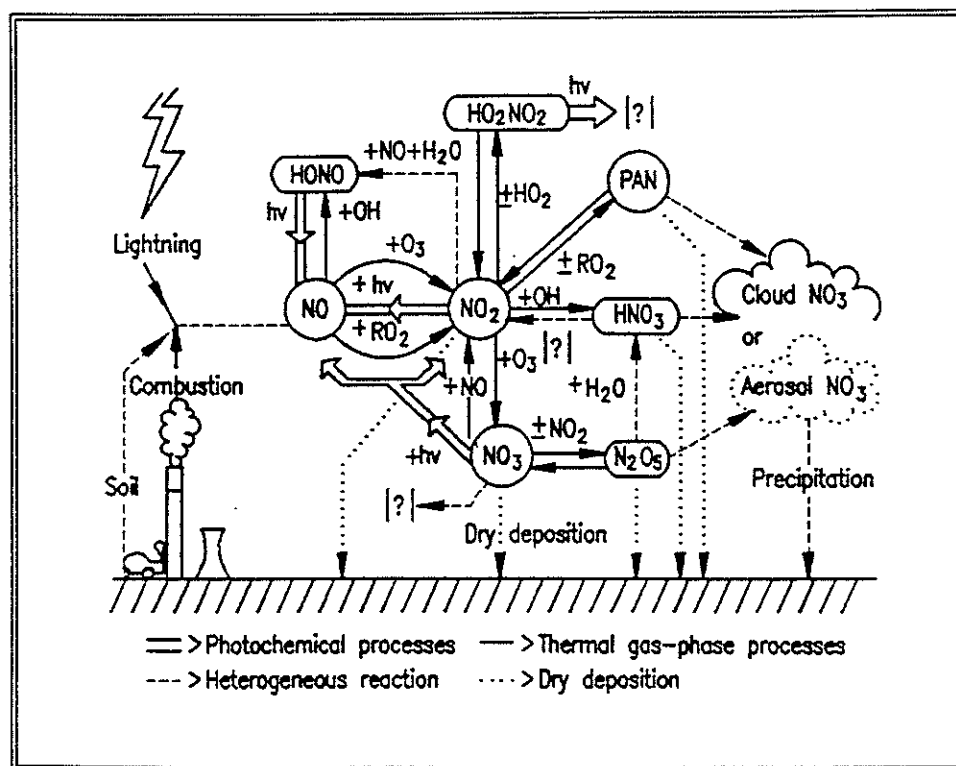
## ENGINEERING OF AMMONIA INJECTION GRIDS USED IN SELECTIVE CATALYTIC REDUCTION SYSTEMS

### Introduction

As fossil fuels and other combustible products are consumed in industrial processes, in the generation of electricity for example, or in numerous other ways, nitrogen oxides—a combination of nitrogen dioxide and nitric oxide—are formed as components of the exhaust gas. Sources of these nitrogen oxides (commonly called  $\text{NO}_x$ ) have been separated by government regulatory agencies into **mobile sources** (such as automobiles, trucks, and mobile diesel powered equipment), and **stationary sources** (including gas turbines, industrial boilers, and refinery heaters).

While air chemistry is very complex, the emissions of  $\text{NO}_x$  into the atmosphere have proven negative impacts upon the environment—first, by direct exposure, and subsequently by contributing to the formation of acid rain and photochemical oxidant (ozone), and dry acid deposition. Below is a diagram that illustrates examples of predictable environmental impacts of  $\text{NO}_x$  emissions.

Figure 1 •  $\text{NO}_x$  and the Environment



## OVERVIEW OF THE SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM

### Major Components of the System

A number of technologies exist to reduce the  $\text{NO}_x$  emissions generated by these sources. One such technology, selective catalytic reduction (SCR), has been successfully applied to **stationary** combustion sources, with the capability of reducing  $\text{NO}_x$  emissions from each single source by up to 95 percent. Although SCR technology has been available since the late 1950's, most industries and companies did not implement the process on a wide scale until it was determined to be the best and most efficient way to bring  $\text{NO}_x$  emissions to the lowest levels required.

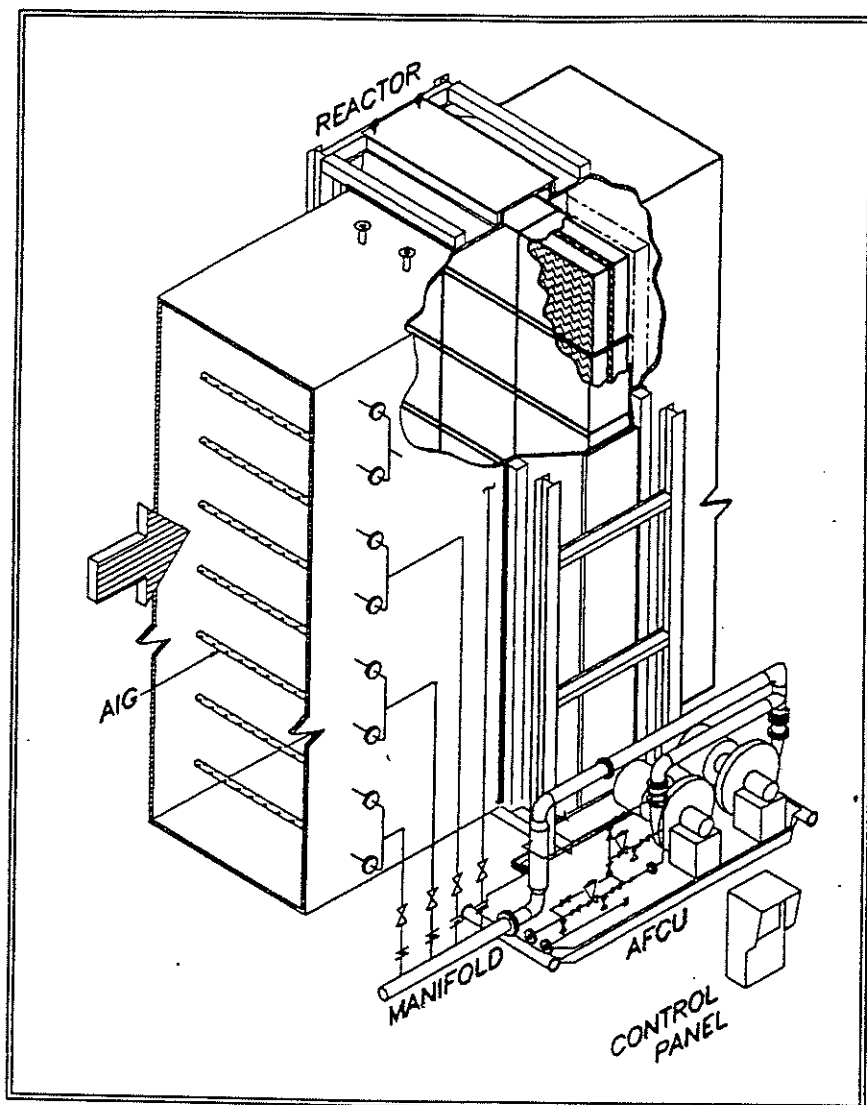


Figure 2 • Configuration of a Typical SCR System  
(Heat Recovery Steam Generator Application)

Figure 2 at left illustrates the major components of an SCR system. The  $\text{NO}_x$ -laden exhaust gas passes over the **ammonia injection grid (AIG)** where ammonia vapor is dispersed. The **manifold** and external piping transport the ammonia vapor from the **ammonia flow control unit (AFCU)**. The mixed gas and ammonia vapor then enter the **reactor** and pass through a catalyst bed. A chemical reaction occurs in the reactor which reduces the nitrogen oxides to harmless nitrogen gas and water vapor. Operation of the entire system is precisely regulated and monitored by the **control system**. The selective catalytic reduction process is examined in more detail below.

### The SCR Process

**Step One - Ammonia Evaporation** - Anhydrous ammonia (99.5-percent pure ammonia) or aqueous ammonia (a solution of approximately 25- to 30-percent ammonia) is normally stored in liquid form. Aqueous ammonia is much safer to handle, store and transport than anhydrous ammonia. Several grades of both anhydrous and aqueous ammonia are available, and selection of the appropriate type and grade is the first step in the design of an SCR system. Aqueous ammonia is evaporated in a special evaporator tower; the mixture of air and ammonia is usually about five percent ammonia and 95 percent air.

## The SCR Process - CONTINUED

**Step Two - Ammonia Injection and Mixing** - The ammonia mixture is injected into the exhaust gas to mix with the  $\text{NO}_x$ . This ammonia must be mixed as evenly as possible in the exhaust gas. "As evenly as possible" means that the concentration of ammonia at the catalyst face cannot vary more than  $\pm 10$  percent (depending upon the application). The design challenge is frequently intensified when this mixing must be achieved in an extremely short distance. The focus of this paper is the optimum design of the AIG, and more detail will be presented in the section of this paper entitled "Manifold and Injection Grid Design."

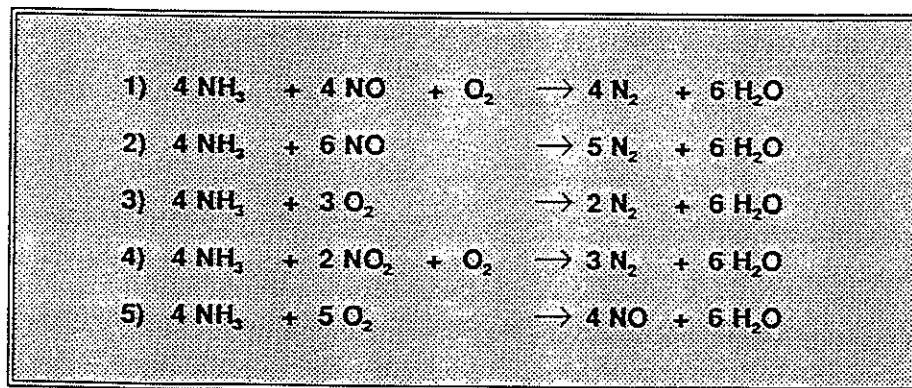
**Step Three - Catalytic Reaction** - As the mixed  $\text{NO}_x$  and ammonia pass through the catalyst, the chemical reactions depicted in Figure 3 occur. Because the chemical reaction is accelerated by the catalyst, selection of an appropriate catalyst material is essential to the most efficient  $\text{NO}_x$  reduction. If untreated exhaust gas seeps out of the reactor that holds the catalyst material,  $\text{NO}_x$  reduction efficiency is diminished and unreacted pollutants are released into the atmosphere. The reactor, therefore, should be designed and manufactured to be airtight. The chemical process of SCR technology is discussed more fully in the section of this paper entitled "The Chemistry of Selective Catalytic Reduction."

**Step Four - Control of Ammonia Slip** - A control system uses a  $\text{NO}_x$  sensor in the exhaust gas stream to precisely control the amount of ammonia injected into the stream to prevent the emission of unreacted ammonia into the atmosphere. An airtight reactor design is critical to the prevention of ammonia slip.

## THE CHEMISTRY OF SELECTIVE CATALYTIC REDUCTION

Selective catalytic reduction is a chemical process by which nitrogen oxides ( $\text{NO}_x$ ) are chemically reduced to nitrogen ( $\text{N}_2$ ) and water vapor. The reaction requires the presence of oxygen, a reducing agent such as ammonia, and a catalyst to produce the desired result—the maximum reduction of the  $\text{NO}_x$ . The temperature window for the reduction reactions ranges from 475 to 1100 degrees Fahrenheit. The variance of temperatures is so great because of the many catalyst compositions available for a wide variety of applications. Several of the competing chemical reactions that occur in this environment are shown below:

Figure 3 • Various Chemical Reactions in the SCR Process



In order to drive the first four reactions to the right and minimize the oxidation rate of ammonia to  $\text{NO}_x$  shown in the fifth reaction, the proper temperature, velocity, and  $\text{NO}_x$  and ammonia concentration profiles must be maintained at the catalyst face as the exhaust gases pass over the SCR catalyst bed.

## MANIFOLD AND INJECTION GRID DESIGN

Although these chemical reactions appear simple, real-world SCR systems are quite complex in design. And since thorough mixing of the ammonia and exhaust gases is the most critical element of complete  $\text{NO}_x$  reduction, design of the ammonia injection grid (AIG) is one of the greatest design challenges in the engineering of an SCR system.

Once the ammonia mixture is ready for injection, the object is to inject it as evenly as possible into the duct upstream of the catalyst. This requires a manifold and a distributor. This distributor is commonly referred to as the ammonia injection grid (AIG), and it is usually made from pipe or tubing with perforated orifices. These orifices create ammonia mixture jets which inject into the free stream exhaust gas. The pipe or tubing should generally be stainless steel due to the usually elevated temperatures where the AIG is located.

Good distribution to the gas requires careful engineering of the manifold and AIG to insure evenness of flow to all jets. This is not difficult, given an ample amount of supply pressure to the grid and proper placement of the AIG from the catalyst face. The design requiring the least amount of pressure loss requires an iterative melding of design and analysis. This of course reduces long-term operating costs.

The equations governing the even distribution of gases to all parts of an AIG can be derived from equations of momentum and pressure loss in pipes and across orifices. There are two parts of this analysis.

First, the flow distribution to the orifices must not be affected by the length of the AIG. If the pipe is exceedingly long with respect to its diameter—i.e., a high length-to-diameter ( $L/D$ ) ratio—then the nearest AIG orifices will inject the most ammonia, starving the downstream orifices due to pressure drop along the length of the pipes.

Second, the momentum of the ammonia within the AIG must be small in comparison to the momentum in the orifices. The higher the velocity in the pipes, the greater likelihood that the flow will concentrate in the last orifices of the AIG.

An elegant pair of equations has been developed by Senecal. The equations derive from a simple pair of rules based upon momentum and pressure drop:

- A) Momentum in the pipe of the AIG, expressed as  $\rho_a V_p^2$ , must be less than or equal to one-tenth of the pressure drop across the average orifice.
- B) The friction loss in the pipe of the AIG must be less than or equal to one-tenth of the pressure drop across the average orifice.

Momentum	$V_p^2 \leq 1/10(V_o^2)$	(1)
Friction Loss	$f(L/D) \rho_a \frac{V_p^2}{2g_c} \leq 1/10 K \rho_a \frac{V_o^2}{2g_c}$	(2)
where:		
$V_p$	=	Average velocity in pipe of the ammonia injection grid (AIG)
$V_o$	=	Average velocity in orifice of AIG
$f$	=	Friction factor for the pipe
$L/D$	=	Length-to-diameter ratio
$K$	=	Empirically determined head loss coefficient
$g_c$	=	Gravitational constant
$\rho_a$	=	Density of ammonia gas

Figure 4  
Senecal's Equations

These equations, which assume fully turbulent plug flow, can be expressed mathematically as illustrated on the left.

## MANIFOLD AND INJECTION GRID DESIGN - CONTINUED

The better the distribution of the ammonia in an AIG system, the less expensive the operating cost. Ammonia maldistribution results in wasted ammonia. Suppose that the ammonia is maldistributed to  $\pm 30$  percent over the AIG orifices. Some spots experience 30 percent less ammonia than necessary to reduce nitrogen oxides ( $\text{NO}_x$ ). In order to increase the flow of ammonia to these dilute regions, the control system must increase the overall flow to the AIG by 30 percent. As a result, the catalyst will experience 30 percent excess ammonia—ammonia which will not be reacted and will pass to the atmosphere. This can result in a loss of overall efficiency and increased ammonia slip. Ammonia slip is being monitored much more closely today by the Environmental Protection Agency (EPA), and ammonia has been listed as an air toxin.

In addition, the better the ammonia distribution, the less catalyst required. Additional catalyst means more cost for original and replacement catalyst, and results in greater pressure loss. Also, it is believed that uneven distribution causes premature depletion of the catalyst.

### Jet Dispersion and Mixing

The jets issuing from the AIG grid force the ammonia mixture to be mixed into the exhaust stream. This is accomplished using two different mechanisms: free turbulence and forced stirring.

Free turbulence occurs due to the turbulence of the exhaust stream and the turbulence generated by the interaction of the AIG distributor pipes with the injected jets. See Figure 5 at right.

Forced stirring is created using an airfoil or blunt body to stir the jets into the exhaust stream. A stationary appendage can accomplish this by using the flowing energy of the free stream. The result is a slight increase in pressure drop but an increased rate of mixing.

Figure 5 • Free Turbulent Jet Mixing

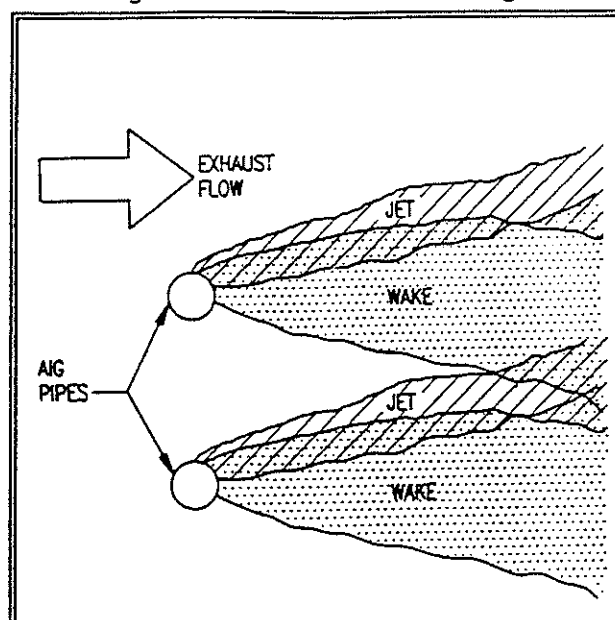
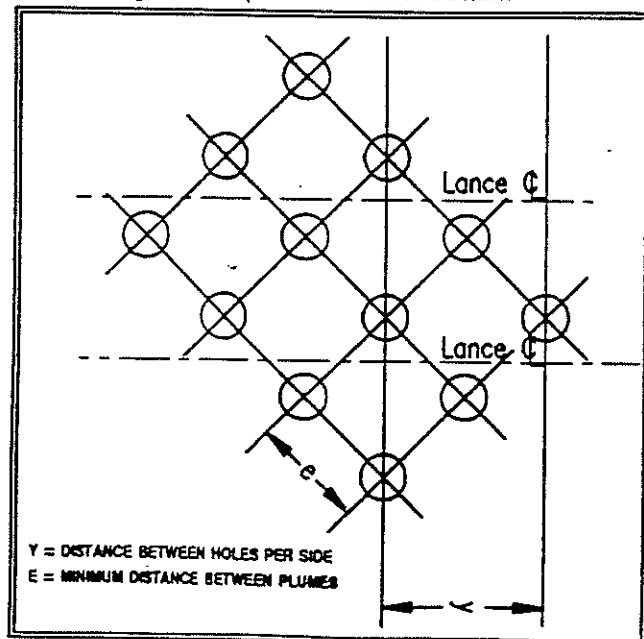


Figure 6 • Optimized Plume Pattern



The most common AIG design depends upon free turbulence from the flow and grid to mix the gases. The orientation of the jets is important. Certain patterns as shown in Figure 6 at left are optimum for jet dispersion and mixing.

The objective is to create as even a pattern as practical from a given spacing of lances. The design shown in this figure creates a square pattern of jet plumes in cross section just ten to twenty orifice diameters downstream of the grid lances. These are optimally positioned for free turbulence mixing before encountering the catalyst.

## Jet Dispersion and Mixing - CONTINUED

The trajectories of jet plumes can be computed using a correlation of the form developed by Rudinger.

$$\frac{y}{d} = K_1 J^a \left( \frac{x}{d} \right)^b \quad (3)$$

where:

$$J = \text{Jet momentum ratio} \left( \frac{\rho_j V_j^2}{\rho U^2} \right) \quad (4)$$

and:

y	=	Penetration of jet
d	=	Orifice diameter
x	=	Distance downstream
a, b	=	Correlation exponents
$\rho_j$	=	Density of the jet fluid
$V_j$	=	Velocity of the jet fluid
$\rho$	=	Free stream density
U	=	Free stream velocity
$K_1$	=	Correlation coefficient

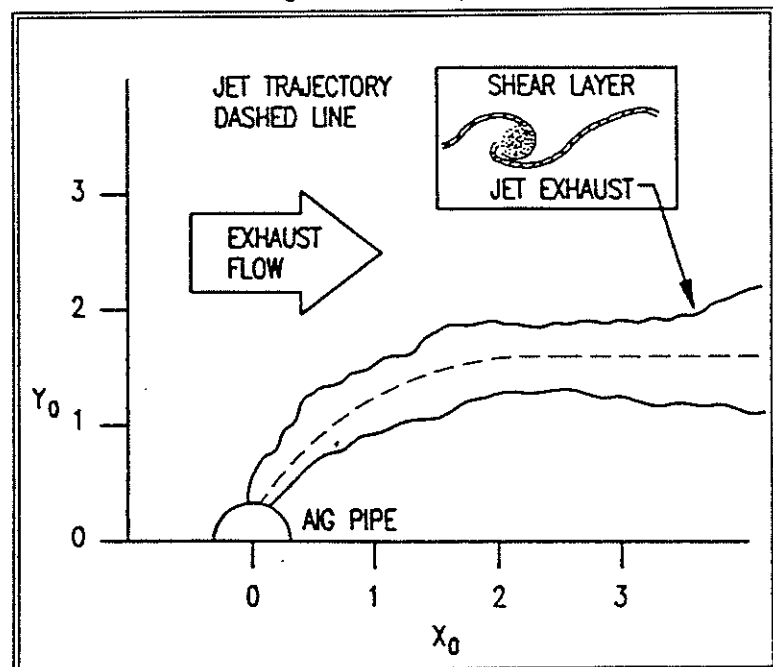
Figure 7 • Jet Trajectory

This equation is useful for designing the AIG grid orifice pattern. The orifice pattern can be optimized for a given lance spacing. The factor  $K_1$  and the exponents  $a$  and  $b$  must be determined from experimental tests or computational fluid dynamics (CFD) models of the AIG lances in crossflow. Figure 7 at right illustrates a jet trajectory.

### Mixing Length

Once the jets are dispersed, turbulent mixing ensues. The transverse jets create their own turbulent vortices which spiral off both sides of the jet. After the jet plumes have turned 90 degrees, they also interact with the turbulent wake of the lances. Although seemingly chaotic in nature, the effects of this mixing process can be predicted using proven calculations. Correlations have been developed to estimate the mixing length required to reduce the concentration fluctuations to a desired amount.

Breidenthal, et al. have developed one such correlation based upon experiments with helium and nitrogen. An aspirating probe was used to measure the concentration fluctuations. This work supports the general theory that large scale turbulent eddies govern mixing rates. Mixing rates are a function of flow geometry and jet/free stream momentum ratios. Surprisingly, these factors create observable eddy patterns which are independent of the Reynolds Number. It is these eddy patterns which are critical to the rate of effective mixing. Molecular diffusion is very rapid in comparison, and does not limit the mixing process in the shear layer between the two fluids.



### Mixing Length - CONTINUED

Breidenthal's Correlation is useful for determining the size ratio of an AIG to the catalyst mixing chamber. Central to the formulation is his jet momentum ratio  $J_B$ :

$$J_B = \frac{\sum \rho_j V_j^2 A_j}{\rho U^2 A} \quad (5)$$

where:

$$\begin{aligned} A &= \text{Free stream duct area} \\ A_j &= \text{Area of the jet orifice} \end{aligned}$$

Others as defined before.

From experimentation, the following correlation has been developed to find the concentration fluctuation at any point downstream of the injection grid.

$$\frac{c'}{c} = \frac{K_2 D}{J_x} \quad (6)$$

where:

$$\begin{aligned} c' &= \text{Concentration fluctuation} \\ c &= \text{Average concentration} \\ D &= \text{Hydraulic diameter of duct} \\ J_B &= \text{Jet-to-free-stream momentum ratio} \\ K_2 &= \text{Constant derived from experimental data} \end{aligned}$$

The  $K_2$  value is a function of the geometry of the injector grid and mixing chamber. Its value can vary greatly. The significance of this equation is the organization of the important variables which affect the mixing length required. The art of mixing chamber design can be summed up in two important variables,  $K_2$  and  $J$ . The lower  $K_2$ , the shorter the mixing length required. Good mixing chamber design results in  $K_2$  values below 0.4. Conversely, the higher the value of  $J$ , the shorter the mixing length.  $J$  is dependent upon the pressure available to the AIG manifold and is thus an energy cost to operations.

### CFD in Mixing Design

Computational fluid dynamics (CFD) can aid in the design of the AIG mixing chamber. The interaction of the injected jets of ammonia mixture and the exhaust free stream can be simulated using the finite difference technique. Comparisons between mixing chamber geometries can be made to determine the effectiveness of various forced mixing devices.

CFD uses a gradient-diffusion model which is known to be accurate for mixing in turbulent shear layers. The effective mixing rate in turbulent flows is estimated using the turbulent viscosity or eddy viscosity. This eddy viscosity is found using a turbulence model of isotropic form. The turbulent viscosity can be thousands of times higher than molecular viscosity and thus the mass diffusion of the gas is greatly affected. At the shear layer interface between the jet and the free stream, the turbulence can be quite high, which results in a greatly increased mixing rate. Following is the formula for computing mass diffusion.

$$\dot{M}_1 = \left( \rho D_{i,m} + \frac{\mu_t}{S_c} \right) \frac{\partial m_i}{\partial X_i} \quad (7)$$

where:

$$\begin{aligned} D_{i,m} &= \text{Diffusion coefficient for species } i \text{ in the mixture} \\ \mu_t &= \text{Turbulent viscosity} \\ S_c &= \text{Schmidt Number} \\ \frac{\partial m_i}{\partial X_i} &= \text{Concentration gradient in the X-direction} \\ \dot{M}_1 &= \text{Mass diffusion flux} \end{aligned}$$

Others as defined before.

## CFD in Mixing Design - CONTINUED

The mass diffusion equation yields accurate estimates of time-averaged concentration distribution at every finite volume in the model. Thus, a CFD model can identify regions of uneven concentration at any point in the flow field, including the catalyst face.

In addition, a CFD model provides two- or three-dimensional velocity and turbulence fields. These are useful for designing the SCR system with good exhaust flow distribution to the catalyst, which is important to efficient operation as well.

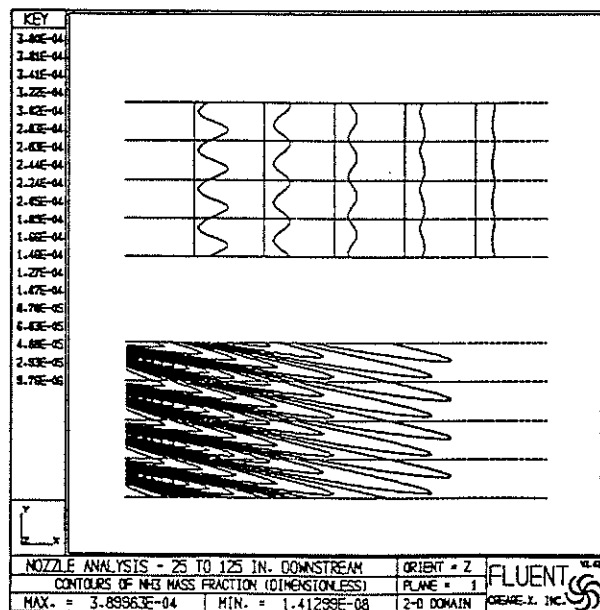
## CFD Results

The results of a CFD study provide two significant facts about the mixing design:

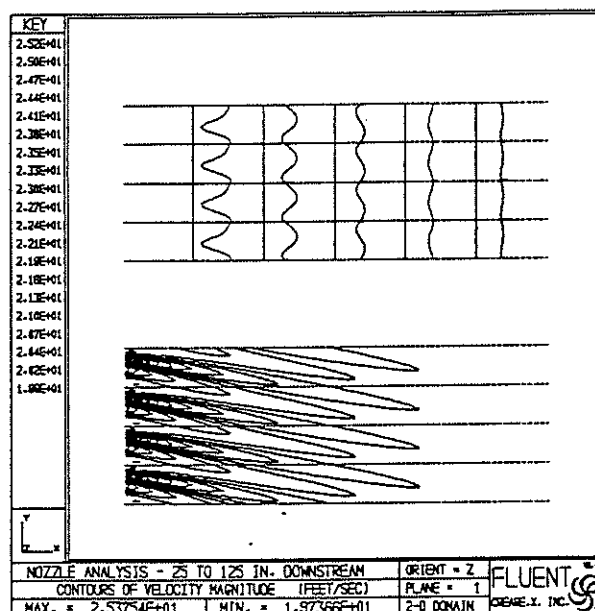
- **Velocity Profile** - A three-dimensional contour map of gas velocity at the catalyst face will reveal the maximum velocity. The *maximum* velocity divided by the *average* velocity yields the maldistribution ratio (which should always be less than 1.1).

Figure 8 at right illustrates the profiles and contours of velocity magnitude before the catalyst. Good velocity distribution is required to optimize the SCR system design. Maldistribution of velocity leads to premature replacement of the catalyst, poor  $\text{NO}_x$  reduction, and/or excess ammonia slip. The result shown is from a model of free turbulent mixing for an actual application.

**Figure 9 • CFD Results**  
**Mass Fraction Ammonia • Side View at Catalyst**  
(CONTOURS AND PROFILES)



**Figure 8 • CFD Results**  
**Contours of Velocity Magnitude at the Catalyst Face**  
(CONTOURS AND PROFILES)



- **The Ammonia Concentration in the Exhaust Gas** - Is the second important finding in a CFD study. A time-averaged result at the catalyst face is depicted in Figure 9 at left. The regions of high concentration are shown darker for clarity. The high concentration regions correspond to the jet positions in the grid. The areas of high concentration propagate downstream in shadow-like fashion. The flattening illustrated by the profiles results from turbulent mixing.

## CFD Results, CONTINUED

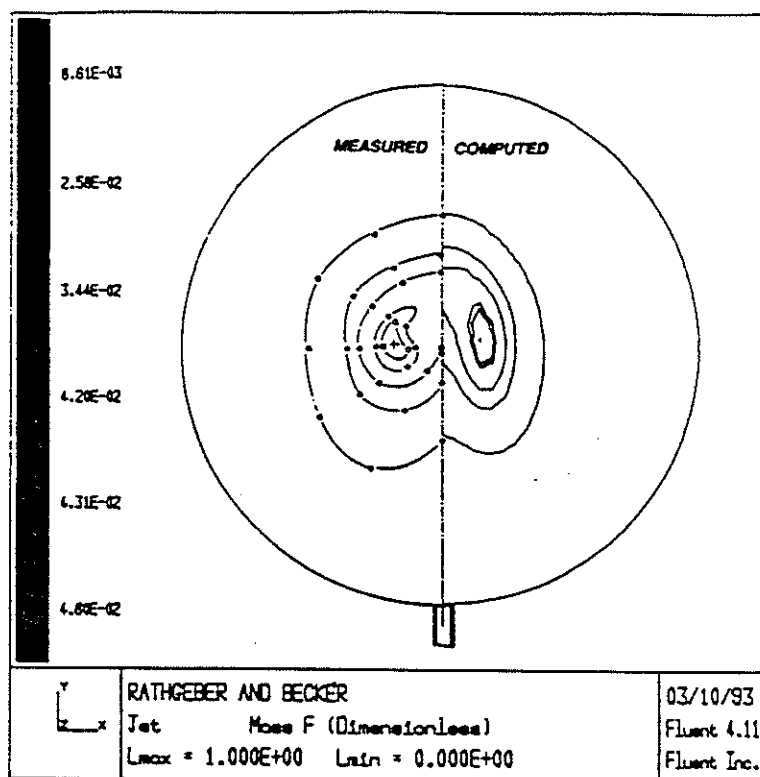
Results from CFD studies are known to be accurate. Several reliable CFD benchmark studies have been published regarding turbulent mixing. Peerless engineers have performed a benchmark study using experimental measurements by Rathgeber, and the CFD results confirmed the mixing duct measurements. (See Figure 10 below right.) Computational fluid dynamics has emerged as the most credible method outside of physical testing to confirm the mixing systems design.

## CASE STUDY

Peerless Mfg. Co. retrofitted a poorly designed ammonia injection grid system using the design criteria in this paper. The customer reported high ammonia consumption and both  $\text{NO}_x$  and ammonia emissions (slip) which greatly exceeded allowable EPA limits.

Upon a detailed investigation, an ineffective ammonia/air mixer was found, along with an ammonia injection grid that was obviously not distributing ammonia evenly to the catalyst face. A traverse of the duct concluded that the temperature, velocity, and  $\text{NO}_x$  profiles at the catalyst face were not the causes for the reported problems. The original suppliers' ammonia mixer and injection grid were replaced with designs based upon guidelines discussed in this paper. As a result of replacement with the newly designed equipment, ammonia consumption has been lowered, and EPA requirements for both  $\text{NO}_x$  reduction and ammonia slip are being met or exceeded.

**Figure 10 • Rathgeber Jet Mixing Benchmark  
Measured vs. CFD Computer Results  
Transverse Jet in Crossflow**



## CONCLUSIONS

Proper ammonia injection grid design results in reduced costs of original equipment and operation of an SCR  $\text{NO}_x$  removal system. However, it is an area which is largely neglected in the engineering design stage. In summary, good AIG design leads to lowered costs:

- **Ammonia** - Less will be used in the reduction process.
- **Catalyst** - Both the original purchase (less catalyst is required with good ammonia distribution) and replacements (good distribution should lead to longer catalyst life).
- **Ammonia Flow Control System** - Smaller pipes, smaller blowers, and smaller evaporators.
- **Reactor** - Can be smaller because less catalyst material is required.
- **Pressure Loss** - With good ammonia distribution, less catalyst is required. This results in less pressure loss and increased horsepower, or throughput.

Field results like those described in the case study above prove the importance of careful and precise ammonia injection system design.

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- 1) Cobb, David, et al, "Application of Selective Catalytic Reduction (SCR) Technology for NO<sub>x</sub> Reduction From Refinery Combustion Sources," *Environmental Progress*, Vol. 10, No. 1, February 1991, pp. 49 - 59.
- 2) Ichiki, Masayoshi, et al, "Development of New Type De-NO<sub>x</sub> Catalyst - Reactor Design and Performance in the Actual System," *The Hitachi Zosen Technical Review*, Volume 52, No. 3, November 1990.
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- 10) Rathgeber, D.E., *Thesis*, Department of Chemical Engineering, Queen's University at Kingston, c. 1974.

## LIST OF FIGURES

- 1) NO<sub>x</sub> and the Environment
- 2) Configuration of a Typical SCR System
- 3) Various Chemical Reactions in the SCR Process
- 4) Senecal's Equations
- 5) Free Turbulent Jet Mixing
- 6) Optimized Plume Pattern
- 7) Jet Trajectory
- 8) CFD Results - *Velocity Contours at the Catalyst Face*
- 9) CFD Results - *Mass Fraction Ammonia • Side View at Catalyst*
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## NOMENCLATURE

$A$	=	Free stream duct area
$A_j$	=	Area of jet orifice
$a, b$	=	Correlation exponents
$c$	=	Average concentration
$c'$	=	Concentration fluctuation
$D$	=	Hydraulic diameter of duct
$d$	=	Orifice diameter
$D_{i,m}$	=	Diffusion coefficient for species $i$ in the mixture
$f$	=	Friction factor for pipe
$g_c$	=	Gravitational constant
$J$	=	Jet momentum ratio
$J_B$	=	Jet-to-free-stream momentum ratio
$K_1$	=	Correlation coefficient
$K_2$	=	Constant derived from experimental data
$L/D$	=	Length-to-diameter ratio
$\dot{M}_i$	=	Mass diffusion flux
$m_i$	=	Concentration of species $i$
$S_c$	=	Schmidt Number
$U$	=	Free stream velocity
$V_j$	=	Velocity of jet fluid
$V_O$	=	Average velocity in orifice of ammonia injection grid (AIG)
$V_p$	=	Average velocity in pipe of AIG
$x$	=	Distance downstream
$x_i$	=	Direction of gradient of $m_i$
$y$	=	Penetration of jet
$K$	=	Empirically determined head loss coefficient
$\mu_t$	=	Turbulent viscosity
$\rho$	=	Free stream density
$\rho_a$	=	Density of ammonia gas
$\rho_j$	=	Density of jet fluid

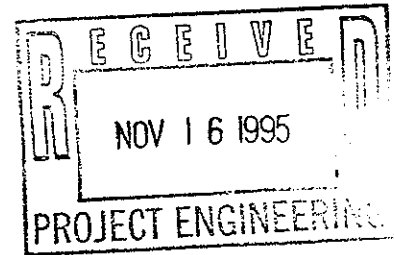
READERS MAY USE ANY CONSISTENT SET OF UNITS DESIRED.

Pfizer Pharmaceuticals, Inc.  
Rd. 2, Km. 58.2, P.O. Box 628  
Barceloneta, P.R. 00617



R. Massey  
Pharmaceuticals

November 14, 1995



Mr. Kenneth Eng  
Chief, Air Compliance Branch  
United States Environmental Protection Agency  
Region II  
Jacob K. Javits Federal Building  
New York, New York 10278-0012

Re: Pfizer Pharmaceuticals Inc, Barceloneta Puerto Rico  
PSD Non-Applicability Determination  
Utility Plant Expansion

Dear Mr. Eng:

This is in response to your letter of July 7, 1995, in which your office made a preliminary determination that our proposed utility plant expansion would not be subject to PSD. As you recall, the scope of the utility plant expansion is to install five Caterpillar diesel engine electric generators (rated at 1600 KW each); one supplemental fired heat recovery steam generator (HRSG) (steam capacity of 30,000 lb/hr); and one package boiler (steam capacity of 30,000 lbs/hr). Two existing Superior boilers (each with steam capacity of 13,800 lb/hr) will be decommissioned and removed.

In your letter, you indicated that a final determination of PSD non-applicability would be made upon receipt of a PREQB permit to construct that incorporated the proposed permit conditions which were attached to your preliminary determination. The purpose of the proposed permit conditions is to ensure that emissions of SO<sub>2</sub> and NO<sub>x</sub> do not exceed PSD de minimis levels. These conditions included an overall fuel usage cap on the utility plant as well as fuel limitations on individual emission units. The fuel limitations on individual emission units was deemed necessary because the different types of emission units, i.e. engine, HRSG, and Package Boiler, have different NO<sub>x</sub> emission factors.

Pfizer has decided to conduct continuous emission monitoring (CEM) for NO<sub>x</sub> for the engine and HRSG exhaust at a single point, i.e. at the stack. We believe that CEM will provide better data regarding actual emissions than use of emission factors and calculations, and therefore will provide a better basis for assuring that emissions will not exceed PSD de minimis levels. In view of this improved emission monitoring plan, several of the conditions proposed in your July 7 letter should be revised. In particular, we believe that fuel limitations on individual units should be deleted since, with the single CEM, they are now unnecessary to demonstrate that emissions are below the NO<sub>x</sub> de minimis level, would impose unnecessary record keeping requirements, and would needlessly limit operational flexibility.

Basically, we propose to use the following formula to show that we remain below the NOx de minimis level (after netting):

*(Total NOx from Engine + HRSG) + (Package Boiler NOx) < 56 tons (for any consecutive 365 days)*

*Where:*

*Engine and HRSG NOx will be monitored through a single CEM and, Package Boiler NOx will be determined by tracking fuel usage and applying the manufacturer's guaranteed emission factor.*

The above formula is essentially the same as your proposed condition # 5 except a CEM will be used in place of engine and HRSG emission factors. We believe that the tracking of total fuel usage for the utility plant is appropriate to demonstrate that we remain below the PSD de minimis for SO2.

In consideration of the above, we are requesting that the PREQB issue a permit to construct with conditions that reflect the use of CEM for the cogeneration plant. The attached table (Attachment 1) summarizes the revisions that we have made in the conditions proposed in your July 7 letter. Since the project and projected levels of emissions have not changed we believe that there is no need for your office to re-evaluate the applicability of PSD to the project.

Since we plan to start construction soon, please advise us as soon as possible if you disagree with any of the revised conditions. If you have any further questions please do not hesitate to contact the undersigned at (809) 846-4300.

Sincerely yours,



Mr. Carlos Lopez  
Manager of Environmental, Health and Safety

cc: Francisco Claudio, Director  
Section of Air - PREQB

Attachment 1 -11/14/95

Revisions to EPA's Proposed PREQB Permit to Construct Conditions for PPI's Utility Plant Expansion

Proposed Condition	Comments and/or Revised Language
1.	No revision except last sentence clarified to read "The sulfur content of the fuel must not exceed 0.2 percent (0.2%) by weight (average weight percent over any period of 365 consecutive days).
2.	Delete condition since the NOx emissions from HRSG and engines will be continuously monitored.
3.	Delete condition for same reason as # 2 above.
4.	Delete condition since NOx emissions will be tracked through modified conditions # 5 and # 8.
5.	<p>Revise as follows: Pfizer will demonstrate to PREQB that NOx emissions from the five engines and the HRSG and package boilers for any consecutive 365 days do not exceed 56 tons on the basis of the following formula:</p> $(\text{Total NOx from Engines and HRSG}) + (\text{Total NOx from Package Boiler}) < 56 \text{ tons}$ <p>where:</p> <p>Total NOx from Engines and HRSG will be monitored through a single CEM (note: flue gas from engines and HRSG are vented through a common stack prior to CEM). The NOx which will be recorded in lbs/hr by the CEM system will be tracked as total lbs over a rolling 365 day period.</p> <p>Total NOx from the Package Boiler determined by manufacturer's guaranteed emission factor and fuel usage (Package Boiler total gallons consumed x 13.6 lb NOx/1000 gals). The total gallons consumed is over a rolling 365 day period.</p>
6.	No change
7.	No change
8.	<p>The sentence "Pfizer will use the following formula.....the Superior Boilers); and the formula which follows, revised as follows:</p> <p>Pfizer will use the following formula to show that NOx emissions during any consecutive 365 day period do not exceed 43 tons (excluding emissions from the operation of the Superior Boilers):</p> $(\text{Total NOx from Engines and HRSG}) + (\text{Total NOx from Package Boiler}) < 43 \text{ tons}$ <p>where:</p> <p>Total NOx from Engines and HRSG will be monitored through a single CEM (flue gas from engines and HRSG are vented through a common stack). The NOx which will be recorded in lbs/hr by the CEM system will be tracked as total lbs over a rolling 365 day period.</p> <p>Total NOx from the Package Boiler determined by manufacturer's guaranteed emission factor and fuel usage (Package Boiler total gallons consumed x 13.6 lb NOx/1000 gals). The total gallon consumed is over a rolling 365 day period.</p>

Table Continued

9.	<p>Revise to reflect that a single CEM will monitor HRSG and Engine emissions. The sentences starting with "Pfizer will demonstrate through the use of continuous emission monitoring....." revised as follows:</p> <p>Pfizer will monitor NOx from the engines and HRSG unit through the use of continuous emission monitoring at the exhaust of the HRSG unit. Emissions for any 365 consecutive period shall be calculated by adding the daily NOx emissions from the engines and the HRSG to the total emissions during the preceding 364 calendar days.</p>
10.	Revise first sentence as follows: The continuous emission monitoring system (CEM) shall be on-line and operational during 95% of the time when the engines and/or the HRSG are operating.
11.	Delete condition since NOx emissions will be tracked in accordance with revised condition #5.
12.	No change
13.	No change
14.	Delete condition since there will be a single CEM for the engines and HRSG (see revised condition 10).
15.	Delete for same reason as indicated in Condition #14 above.
16.	No change.
17.	Revise last part of sentence— "and the results of calculations in Conditions # 5 and # 8.
18.	No change
19.	No change
20.	No change
21.	No change
22.	No change
23.	<p>New condition:</p> <p>During the initial period of system startup (180 days) and in the event that the CEM malfunctions or is not operable, Pfizer shall estimate and document NOx emissions from the five engines and the HRSG and Package Boilers on the basis of the following formula:</p> $\{(\text{Engine gals} \times 20.37 \text{ lb NOx/mgal}^1) + (\text{HRSG gals} \times 20.4 \text{ lbs NOx/mgal}^1) + (\text{PB gals} \times 13.6 \text{ lb NOx/mgal})\} \times \{1 \text{ ton}/2000 \text{ lbs}\} < 56 \text{ tons (for any consecutive 365 day period)}$ <p>where:  mgal= 1000 gallons  Engine gals= the total gallons of fuel consumed in the engine over any consecutive 365 day period/  HRSG gals = the total gallons of fuel consumed in the HRSG boiler over any consecutive 365 day period.  PB gals= the total gallons of fuel consumed in the Package Boiler over any consecutive 365 day period.</p> <p>Notes 1- These factors have recently been adjusted . See attachment 2 for basis of adjusted emission factors.</p>

## Attachment 2- 11/14/95

### Adjusted NOx Emission factors for HRSG Unit and Engines

We have adjusted the NOx emission factors for the Engines and HRSG Unit to more accurately reflect expected emissions under anticipated operating conditions. The original HRSG emission factor was based on maximum utilization of the engines and did not allow us to account for lower NOx emissions expected under periods of low or no engine utilization. The adjusted factors do. It is important to note that the adjusted factors do not affect our estimate of maximum annual NOx emissions from the project which were based on maximum engine and HRSG utilization (as detailed in the Air Emission Summary Table-Attachment 1- of our May 2, 1995 memo).

The original HRSG engine emission factor (34.2 lbs/1000 gals) was comprised of two components, NOx contribution from SCR ammonia leakage (13.8 lbs) and NOx contribution from the HRSG burner (20.4 lbs) (see July 3 memo to C. Fazio). The NOx contribution from the SCR ammonia leakage was based on full engine utilization and did not account for lower NOx emissions during periods of decreased engine utilization. In our adjusted factors, the SCR ammonia leakage NOx contribution is assigned to individual engines rather than the HRSG Unit which allows a more accurate estimation of NOx emissions during periods when the engines are not fully utilized. As indicated above, and as the table below illustrates, the adjusted factors do not affect our estimates of NOx emissions under our maximum utilization scenario.

Emission Unit	Contribution From		Emission Factor (lbs/1000 gal)	Fuel Use Expected at Maximum Utilization (gals/yr.)	NOx Expected at Maximum Utilization (tons/yr.)
	SCR Ammonia Leakage	Emission Unit			
HRSG (original factor)	13.80	20.40	34.2	829209	14.18
Engine (original factor)	0	17.64	17.64	4,200,000 <sup>3</sup>	37.04
<b>Total NOx</b>					<b>51.22</b>
HRSG (adjusted factor)	0	20.40	20.40	829,209	8.46
Engine (adjusted factor)	2.73	17.64	20.37	4,200,000 <sup>3</sup>	42.78
<b>Total NOx</b>					<b>51.24<sup>4</sup></b>

#### Notes-

1-Fuel use indicated is the same as indicated in our Air Emission Summary Table (see May 2, 1995 memo)

2-Note the expected NOx is the same as that indicated in the Air Emission Summary Table

3-Engine fuel usage is based on 5 engines operating

4-Slight difference due to rounding

## Support Basis for the Adjusted Engine Factor

### Burner Contribution:

17.64 lbs/1000 gal (see May 2, 1995 Memo Lopez to Eng) Attachment 3 for support calculations.

### Ammonia Leakage from SCR

From page 3 of the July 3, 1995 Support Calculations Memo ( July 3, 1995 Mahoney to Fazio)

NH<sub>3</sub> leakage in SCR effluent=7.38 ppmv  
4501.8 moles/hr of flue gas from the 2<sup>o</sup> SCR effluent for 5 engines running at 100%.

Thus on a per engine basis—4501.8/5 =900.4 moles/hr

Vol% =Mole % for gas and 1 mole NH<sub>3</sub> yields 1 mole NO<sub>x</sub> in HRSG

$(7.38 \times 10^{-6} \text{ mole NH}_3/\text{mole flue gas}) \times (900.4 \text{ mole/hr}) = 6.65 \times 10^{-3} \text{ mole/hr NH}_3 \text{ per engine}$

$(6.65 \times 10^{-3} \text{ mole/hr NO}_x) \times (46.1 \text{ lb/mol} \times 1000) = 0.306 \text{ lbs/hr NO}_x$

Maximum fuel rate of engines at prime = 112 gals/hr

In terms of lbs NO<sub>x</sub> per 1000 gallons:

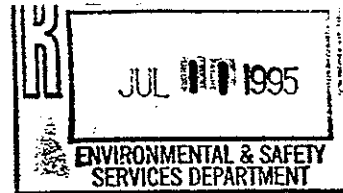
$$\frac{0.306 \text{ lbs/hr NO}_x \times 1000 \text{ gal}}{112 \text{ gals/hr}} = 2.73 \text{ lbs NO}_x/1000 \text{ gal}$$

### Revised Engine NO<sub>x</sub> Emission Factor

17.64 + 2.73 = 20.37 lbs NO<sub>x</sub>/1000 gal



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 2  
290 BROADWAY  
NEW YORK, NEW YORK 10007-1866



JUL 07 1995

Carlos Lopez  
Manager of Environment, Health, and Safety  
Pfizer Pharmaceuticals, Inc.  
P.O. Box 628  
Barceloneta, Puerto Rico 00617

Re: Prevention of Significant Deterioration of Air Quality (PSD)  
Non Applicability Determination  
Pfizer Pharmaceutical, Inc.'s Utility Plant Expansion

Dear Mr. Lopez:

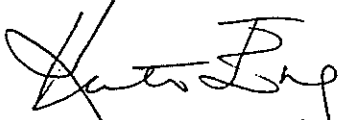
The U.S. Environmental Protection Agency (EPA), Region II Office, has completed its review of Pfizer Pharmaceutical, Inc.'s ("Pfizer's") April 20, 1994 and May 2, 1995 PSD non-applicability requests. The submittals (as well as supporting documents submitted on June 19 and July 3, 1995) were reviewed for applicability pursuant to the PSD regulations codified at 40 CFR §52.21. Based on the information provided, EPA has preliminarily determined that the proposed utility plant expansion would not be subject to PSD provided certain conditions are met.

As you know, the PSD regulations codified in 40 CFR §52.21 apply to a new "major" stationary source as well as to any modification at an existing major source. EPA has reviewed the proposed utility plant expansion in which 5 diesel engines, a heat recovery steam generator, and a package boiler will be installed, while emission reductions will be achieved by the dismantling of 2 existing boilers. The proposal as presented will not result in emissions that exceed the PSD de minimis levels for any regulated pollutant.

This preliminary determination is contingent upon the conditions specified in the Attachment of this letter being incorporated into the Puerto Rico Environmental Quality Board (PREQB) permit to construct. Upon receipt of copies of PREQB's final permit to construct containing the attached permit conditions, EPA will continue its review of this project in order to make a final PSD non-applicability determination. If, however, the conditions in the Attachment are not included or are included in modified form, EPA may be required to re-evaluate the applicability of the PSD regulations to the project relative to the new circumstances.

If you have any questions concerning this correspondence, please contact Christine Fazio of my office at (212) 637-4015.

Sincerely yours,

A handwritten signature in dark ink, appearing to read 'Kenneth Eng', written in a cursive style.

Kenneth Eng, Chief  
Air Compliance Branch

Attachment

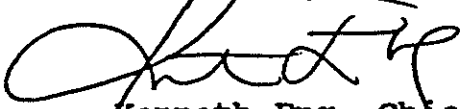
cc: Francisco Claudio  
Puerto Rico Environmental Quality Board

Natalie S. Ricciardi  
Pfizer Pharmaceuticals, Inc.

Mike Mahoney  
Pfizer Inc.

Upon receipt of the additional information, EPA will continue its review of this project. If you have any questions regarding this letter, please call Daisy Mather of my staff at (212) 264-4711.

Sincerely yours,



Kenneth Eng, Chief  
Air Compliance Branch

cc: Francisco Claudio-Rios  
Puerto Rico Environmental Quality Board

### Determination of NOx Emissions Factor for Diesel Engines

"Not to Exceed" NOx Emissions Rate at 100% Engine Load (1) 79.01 lb/hr  
Fuel Rate at 100% Engine Load (1) 112.0 gal/hr  
Destruction of Engine-Generated NOx in Two-Stage SCR Unit 97.5% (2)

$$\text{Engine NOx Emission Factor} = \frac{79.01 \text{ lb/hr} \times 1000 \text{ gal}}{112.0 \text{ gal/hr}} = 705.4 \text{ lb NOx} / 1000 \text{ gal Fuel}$$

$$\text{NOx Emission Factor After Controls} = 705.4 \text{ lb} / 1000 \text{ gal} \times \frac{(100-97.5)}{100} = 17.64 \text{ lb NOx} / 1000 \text{ gal Fuel}$$

#### Notes:

- (1) - NOx emissions rate and fuel rate determined from Caterpillar engine performance data.
- (2) - 97.5% NOx destruction assumed for emissions calculations. SCR vendor is guaranteeing 99% destruction.

Reply to  
Question #1

## Determination of Exhaust Emissions Data for Diesel Engines

### Prime vs. Standby

The operating plan is to run all engines in the prime mode 100% of the time, less engine downtime.

The maximum power output in prime operation is 1600 kW.

Although Pfizer does not intend to run the engines in a standby mode, the engines are rated to run in the standby mode for a maximum of 200 hours per year. The maximum power output in standby operation is 1760 kW.

Each engine is expected to be available for use 85% of the time.

$$8760 \text{ hours/yr} \times 85\% = 7446 \text{ operating hours per year}$$

#### Average Power Output:

Prime:	7246 hr x 1600 kW =	11,593,600	kwh
Standby:	200 hr x 1760 kW =	352,000	kwh
		<u>11,945,600</u>	kwh

Average is 1604 kW over 7446 hours. Rounded to 1600 kW over 7500 hours in Attachment 1.0

### Emissions Data

Emissions in tons/yr are determined by the following general formula:

$$\text{Emissions, tons/yr} = \text{Emissions Factor} \times (1 - \% \text{ Destruction}/100) \times \text{Annual Fuel Consumption}$$

The basis for emissions factors (pre-controls) is as follows:

NO<sub>x</sub>, CO, Hydrocarbons, Particulate Matter - The engine emission factors (pre-controls) are based on Caterpillar engine test data. The "not to exceed" emissions flows in lb/hr at 100% load are divided by the fuel rate at 100% load to obtain the engine emission factor. A sample calculation for NO<sub>x</sub> is attached.

SO<sub>2</sub> - The factor of 28.01 lb / 1000 gal Fuel is based on 0.2 wt. % Sulfur in fuel, with all sulfur assumed converted to SO<sub>2</sub>.

The % destruction of engine-generated pollutants in control devices is based on vendor guarantees, with a conservative safety margin included. Data used are as follows:

Pollutant	Control Method	% Destruction	
		Guarantee	Used in Table
NO <sub>x</sub>	Selective Catalytic Reduction	99	97.5
CO	Thermal Incineration	90	75
HC	Thermal Incineration	90	75
Particulate	Thermal Incineration	80	75
SO <sub>2</sub>	None	0	0

### Sample Calculation for CO:

$$\text{Engine Emission Factor Pre-Controls} = \frac{9.90 \text{ lb/hr} \times 1000 \text{ gal}}{112.0 \text{ gal/hr}} = 88.4 \text{ lb CO} / 1000 \text{ gal Fuel}$$

$$\text{Emission Factor After Controls} = \frac{88.4 \text{ lb} / 1000 \times (100 - 75)}{100} = 22.10 \text{ lb CO} / 1000 \text{ gal Fuel}$$

$$\text{Annual Fuel Consumption} = 112.0 \text{ gal/hr} \times 7500 \text{ hr/yr} = 840,000 \text{ gal/yr}$$

$$\text{Tons/yr Emissions} = 22.10 \text{ lb} / 1000 \text{ gal} \times 840,000 \text{ gal/yr} / 2000 \text{ lb/ton} = 9.28 \text{ tons CO} / \text{yr}$$

Reply to  
Question #2.

Copy: JAY Landwehr

DATE: 04-18-95	PEERLESS MFG. CO. SCR SYSTEMS DIVISION FACSIMILE MESSAGE	PAGE: 1 OF 4
FAX: 809/282-0477	2819 WALNUT HILL LANE DALLAS, TX 75229 FAX: 214/351-0194 TELEPHONE: 214/357-6181	
TO: Pfizer, Inc. ATTN: Mr. Joel Goldberg		FROM: JOHN CONROY
SUBJECT: Pfizer Pharmaceuticals Project Peerless S/O 70053, Pfizer PO PR0737(F)/0201		CC: CEILE/70053

Dear Joel:

I have attached the requested test data received from Norton Chemical Process Products just minutes ago. This is in answer to the June 15, 1994 letter from Mr. Natale S. Ricciardi, item number 3 which shows a diesel engine operating with SCR catalyst installed achieving 95% NOx reduction. I trust that this answers the question posed.

If you have any questions or require any additional information, please do not hesitate to call me at 214/357-6181, extension 5526.

Best Regards,

PEERLESS MFG. CO.



John H. Conroy, P.E.  
Manager of Engineering  
SCR Systems Division

JHC:bal

Reply to  
Question 3

**NORTON CHEMICAL PROCESS PRODUCTS CORPORATION**

**NORTON**

P.O. Box 350  
Akron, Ohio 44309-0350  
(216) 673-5860

**FACSIMILE TRANSMISSION COVER SHEET**  
**Norton Fax (216) 677-3609**

**TO: Peerless Mfg. Co.**

**DATE: April 18, 1995**

**ATTN: Mr. John Conroy**

**No. PAGES: 3**

**FAX: (214) 351-0194**

**REF: Peerless Purchase Order No. 26521-D**  
**Peerless Project 70053 -- Pfizer**

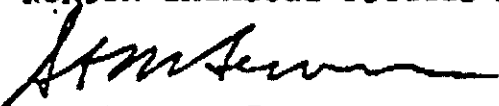
**Dear John:**

Per your request, attached please find operating data from our NC-300 Catalyst installation at Plymouth State College in New Hampshire. The data show that we are achieving over 95% NOx removal over the load range of the engine.

Please let us know if you require any further information.

Sincerely,

**NORTON Chemical Process Products Corporation**

  
**Stephen M. Turner**  
**Manager, Sales & Marketing**  
**Environmental Products**

Attachment  
Conditions To Be Included in PREQB Permit to Construct

Pfizer Pharmaceutical, Inc. plans to expand its utility plant by installing five Caterpillar diesel engine electric generators rated at 1600 KW each; one supplemental fired heat recovery steam generator (HRSG) [with a total steam capacity of 30,000 lb/hr] which extracts heat from the diesel engine's exhaust; and one package boiler [with a total steam capacity of 30,000 lb/hr]. Two existing Superior boilers [each with a maximum steam capacity of 13,800 lb/hr] will be decommissioned and removed. The following conditions must be included in the PREQB permit to construct in order for Pfizer not to be subject to PSD.

1. Fuel usage at the utility is restricted to No. 2 fuel oil or diesel fuel. The total utility consumption shall not exceed 5,634,053 gallons/year per any period of 365 consecutive days. The sulfur content of the fuel must not exceed 0.2 percent (0.2%) by weight.
2. The five (5) 1600 KW diesel engines shall not exceed 4,200,000 gallons of fuel consumed for any 365 consecutive days.
3. The HRSG boiler shall not exceed 829,209 gallons of fuel consumed for any 365 consecutive days except under the terms of Condition #5 below.
4. The package boiler shall not exceed 604,844 gallons of fuel consumed for any 365 consecutive days except under the terms of Conditions #5 and #8 below.
5. The daily rolling fuel usage limits specified for the HRSG boiler (Condition #3) and the package boiler (Condition #4) may be exceeded provided the following conditions are met:
  - a. Pfizer shall notify PREQB and EPA within 30 days of the exceedance; and
  - b. Pfizer demonstrates to PREQB and EPA that NOx emissions from the five engines and the HRSG and package boilers for any 365 consecutive days do not exceed 56 tons on the basis of the following formula:

$$[(\text{Eng. gal} \times 17.64 \text{ lbNOx/mgal}) + (\text{HRSG gal.} \times 34.24 \text{ lbNOx/mgal}) + (\text{PB gal} \times 13.6 \text{ lbNOx/mgal})] \times [1 \text{ ton}/2000 \text{ lbs}] \leq 56 \text{ tons of NOx}$$

Where:

Eng. gal = the total gallons of fuel consumed in mgal in the engines for the rolling 365-day period

HRSG gal = the total gallons of fuel consumed in mgal in the HRSG boiler for the rolling 365-day period

PB gal = the total gallons of fuel consumed in mgal in the package boiler for the rolling 365-day period

mgal = 1,000 gallons.

6. Gallons for any 365 consecutive days shall be calculated by adding the daily fuel usage from the unit(s) to the total fuel usage from the unit(s) during the preceding 364 calendar days. ✓
7. After start-up of the entire new utility plant, the two existing Superior boilers shall be shut down and dismantled. The PREQB permits for these two boilers shall be revoked and, at such time, PREQB will delete the boilers from its emissions inventory. Pfizer shall notify EPA when this condition is invoked. ✓
8. In the event that the package boiler becomes fully operational prior to the 5 diesel engines and HRSG boiler, only one of the existing 16.7 MMBTU/hr heat input Superior boilers can operate at any one time. During this time, the NOx emissions rate for the Superior boilers combined shall not exceed 13 tpy for any 365 consecutive day period. During this initial 365 consecutive days fuel use period, the package boiler may consume up to 2,270,000 gallons of fuel. Pfizer will use the following formula to show that NOx emissions during any consecutive 365 day period do not exceed 43 tons (excluding emissions from the operation of the Superior boilers): ✓

$$[(\text{Eng. gal} \times 17.64 \text{ lbNOx/mgal}) + (\text{HRSG gal.} \times 34.24 \text{ lbNOx/mgal}) + (\text{PB gal} \times 13.6 \text{ lbNOx/mgal})] \times [1 \text{ ton}/2000 \text{ lbs}] \leq 43 \text{ tons of NOx}$$

Where:

Eng. gal = the total gallons of fuel consumed in mgal in the engines for the rolling 365-day period

HRSG gal = the total gallons of fuel consumed in mgal in the HRSG boiler for the rolling 365-day period

PB gal = the total gallons of fuel consumed in mgal in the package boiler for the rolling 365-day period

mgal = 1000 gallons.

This condition expires upon start-up of the entire new utility plant. Pfizer shall notify PREQB and EPA in writing when this condition has expired.

9. Pfizer shall install and maintain dual Selective Catalytic Reduction (SCR) control equipment for the five diesel engines. Each individual engine will be equipped with an SCR unit and the exhaust from the individual engine/SCR units will be ducted to a second stage SCR. Pfizer shall ✓

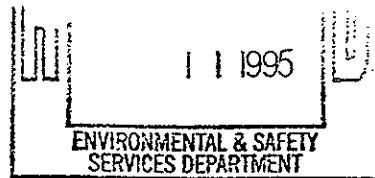
perform a stack test, within 180 days of start-up, of the five diesel engines/dual SCR at maximum rated capacity to verify that the NOx removal efficiency of the dual SCR control is at least 97.5%. Pfizer will demonstrate through the use of continuous emission monitoring at the exhaust of the second stage SCR that total NOx emission rates from the five engines combined do not exceed 37.1 tons for any 365 consecutive day period. Emissions for any 365 consecutive days shall be calculated by adding the daily NOx emissions from the five engines to the total NOx emissions during the preceding 364 calendar days.

10. The continuous emissions monitoring system (CEM) shall be on-line and operational during 95% of the time when the engines are operating. Pfizer shall measure NOx emissions, flow rate, and the proper diluents for converting NOx emissions measured by the CEM from parts per million (ppm) to lb/hour. Pfizer shall properly calibrate, maintain and operate the CEM.
11. In the event that the second stage SCR is down (due to maintenance or other reasons), Pfizer can only operate three of the five diesel engines at any one time. The combined engines cannot exceed 37.1 tons of NOx for any 365 consecutive day period.
12. Low NOx burner technology shall be installed on the HRSG boiler and the package boiler.
13. The NOx emission factors provided by Pfizer for the HRSG boiler (34.24 lbs/mgal) and the package boiler (13.60 lbs/mgal) shall be verified through a stack test within 180 days of start-up of the new utility using EPA approved methodologies.
14. Pfizer shall demonstrate through the use of continuous emission monitoring at the HRSG boiler that the total NOx emission rate does not exceed 14.2 tons for any 365 consecutive day period. Emissions for any 365 consecutive days shall be calculated by adding the daily NOx emissions from the HRSG boiler to the total NOx emissions during the preceding 364 calendar days.
15. The continuous emissions monitoring system (CEM) shall be on-line and operational during 95% of the time when the HRSG boiler is operating. Pfizer shall measure NOx emissions, flow rate, and the proper diluents for converting NOx emissions measured by the CEM from ppm to lb/hour. Pfizer shall properly calibrate, maintain and operate the CEM.
16. Each of the five diesel engines, the HRSG boiler, and the package boiler shall be equipped with operable fuel meters

that must be maintained and calibrated in accordance with the manufacturers' recommendations.

17. Pfizer shall record in a logbook the hours of operation; the fuel usage of the 5 diesel engines, the HRSG boiler, and the package boiler; and the results of any calculations when triggering the formulas in Conditions #5 and #8 above on a daily basis.
18. Pfizer shall continue to submit sulfur-in-fuel reports to the PREQB on a monthly basis, as required by Rule 410 of the Puerto Rico Regulations for the Control of Atmospheric Pollution.
19. All exceedances of the fuel limits or emission limitations established for either of the diesel engines, the boilers or utility-wide shall be reported to the PREQB and EPA in writing within 30 days of their occurrence.
20. All continuous monitoring records and logbooks required shall be maintained for a period of five years from the date of recording and shall be made available for inspection by PREQB and EPA personnel upon request.
21. In accordance with 40 CFR §52.21(r)(4), relaxation of any of the above conditions or restrictions may subject the source or modification to PSD as though construction had not yet commenced on the source or modification.
22. Pfizer shall comply with the New Source Performance Standards for Small Industrial-Commercial-Institutional Steam Generating Units found at 40 CFR Part 60 Subpart Dc and the General Provisions of 40 CFR Part 60 Subpart A for the HRSG and package boilers.

July 3, 1995



To: Chris Fazio (USEPA) via FAX 212-637-3998

From: M. Mahoney (Pfizer)

A handwritten signature in dark ink, appearing to read "M. Mahoney".

Re: PPI PSD Non-Applicability Determination

C.C. Mahoney

J. Keith

C. Lopez

A. Zetterberg

W. Hulm

J. Goldberg

As you requested, attached find backup calculations the NOx emission factors for both the package boiler and heat recovery steam generator (HRSG) boiler. The manufacturer's guarantee for the package boiler and the results of a detailed COEN emission study for the HRSG are the basis for our emission factors from these units. The package boiler NOx guarantee and excerpts of the emission study were included in our May 2, 1995 letter to Mr. Kenneth Eng, as attachments 4.6 and 4.5.1, respectively.

As we discussed today, we are now planning to monitor NOx emissions from the HRSG unit through a CEM. We will advise you should we have any changes to this current plan. Since the details of the CEM operation for the SCR and HRSG unit are being developed as part of detailed engineering, we believe it is appropriate that we submit the details of CEM operation as part of our EQB permit to operate application.

Further, because we now plan to monitor the SCR unit and the HRSG unit continuously, we believe that an initial stack test of the package boiler rather than stack testing every three years is appropriate since control of NOx via a low NOx burner system is fairly straight forward.

Again, thank you for your consideration in this matter. In the near term, I can be reached at 516-921-5612 if you have any further questions.

Mike Mahoney

## Package Boiler NOx Factor Calculations

From CSA support calculations:

Factor in Attachment 1.0 (see letter to Mr. Kenneth Eng dated 5/2/95) is 13.60 lb NOx/1000 gal

75 ppm NOx manufacturer guarantee from attachment 4.6 (letter to K. Eng 5/2/95)

Back calculation:

$$\frac{13.60 \text{ lb/NOx}}{1000 \text{ gal fuel}} \times \frac{\text{mole NOx}}{46.01 \text{ lb NOx}} = \frac{0.2956 \text{ mole NOx}}{1000 \text{ gal Fuel}}$$

From combustion calculations for No. 2 Fuel with 20% excess air:

1169.4 mole/hr flue gas from 254.5 gal/hr fuel

Flue gas has: 12.88 vol % H<sub>2</sub>O and 3.22 vol % O<sub>2</sub>

$$\frac{1169.4 \text{ mole/hr flue gas}}{254.5 \text{ gal/hr fuel}} \times 1000 = 4594.9 \text{ moles flue gas/1000 gal fuel}$$

$$\frac{0.2956 \text{ mole NOx/1000 gal fuel}}{4594.9 \text{ moles flue gas/1000 gal fuel}} = 64.33 \text{ ppmv actual NOx in flue gas}$$

Guarantee is stated as ppmvd at 3% O<sub>2</sub>, so adjustment for water content of flue gas and actual O<sub>2</sub> is required.

$$\text{ppmvd} = \frac{64.33 \text{ ppmva} \times (20.9 - 3\% \text{ O}_2 \text{ reference})}{\left[ \frac{100 - 12.88\% \text{ H}_2\text{O}}{100} \right] \times (20.9 - 3.22\% \text{ O}_2 \text{ actual})} = 74.8 \text{ ppmvd NOx in flue gas}$$

∴ 75 ppmvd NOx in flue gas equiv. to 13.60 lb NOx/1000 gal

Also find attached a NOx emission conversion table (lbs NOx/ mmhBTU to ppm ) from COEN Company Inc. with the formula for # 2 oil at 3% O<sub>2</sub>

$$\text{lbs/mmbtu} = \frac{\text{ppm}}{775}$$

$$\text{lbs/mmbtu} = \frac{75 \text{ ppm}}{775} = .097 \text{ lbs/mmbtu}$$

$$\frac{0.097 \text{ lbs NOx}}{1,000,000 \text{ btu}} \times \frac{136,000 \text{ btu}}{1 \text{ gal}} \times 1000 \text{ gal} = 13.2 \text{ lbs NOx/1000 gal. vs } 13.6 \text{ lbs NOx/1000 gal in Attachment 1.0}$$

## Heat Recovery Steam Generator (HRSG) Boiler NOx Calculations

From CSA support calculations:

The NOx factor for the HRSG is based on a NOx contribution from SCR ammonia leakage and from fuel combustion. The factor indicated in the emission summary table (Attachment 1.0) is 34.2 lbs NOx per 1000 gallons of fuel. The contribution from ammonia leakage from the SCR is 13.8 lbs/1000 gallons and the contribution from fuel combustion is 20.4 lbs NOx/1000 gals. Note, during periods when the diesel engines are not operating the NOx emissions from the boiler will be at the lower rate of 20.4 lbs/1000 gals.

### 1) NOx Contribution from SCR Ammonia Leakage

NOx from ammonia leakage is created in the HRSG, but the rate of NOx from ammonia leakage is a function of engine utilization and is not directly related to the amount of fuel burned in the HRSG.

The NOx contribution from ammonia leakage from the HRSG was determined as follows:

NH<sub>3</sub> Leakage: 5 ppmvd NH<sub>3</sub> in Secondary SCR effluent (manufacturers guarantee-see attachment 1.1.2- PPI submittal April 1994) (NH<sub>3</sub> leakage based on 15% O<sub>2</sub>)

$$\text{ppmvd} = \frac{\text{ppmva} (20.9 - 15.0)}{\left[ \frac{1 - \% \text{H}_2\text{O}}{100} \right] \left[ \frac{20.9 - \% \text{O}}{(1 - (\% \text{H}_2\text{O}/100))} \right]}$$

$$\therefore \text{ppmva} = \frac{\text{ppmvd} \left[ \frac{1 - \% \text{H}_2\text{O}}{100} \right] \left[ \frac{20.9 - \% \text{O}}{(1 - (\% \text{H}_2\text{O}/100))} \right]}{(20.9 - 15.0)}$$

From process material balance:      % O<sub>2</sub> in 2° SCR effluent = 9.53% vol  
    % H<sub>2</sub>O in 2° SCR effluent = 12.71% vol

$$\text{ppmva} = \frac{5 \times \left[ \frac{1 - \frac{12.7}{100}}{100} \right] \left[ \frac{20.9 - \frac{9.53}{100}}{(1 - (\frac{12.7}{100}))} \right]}{(20.9 - 15.0)}$$

ppmva = 7.38 ppmva NH<sub>3</sub> in SCR effluent

From material balance, 4501.8 moles/hr in 2° SCR effluent for 5 engines running at 100%

On an annual maximum basis, individual engines will only average 7500 hrs.

Adjusting for annual maximum flow —  $\frac{7500}{8760} \times 4501.8 \text{ moles/hr} = 3854.3 \text{ moles/hr}$

Vol % = Mole % for gas, and 1 mole NH<sub>3</sub> yields 1 mole NOx in HRSG

$(7.38 \times 10^{-6} \text{ mole NH}_3/\text{mole flue gas}) \times (3854.3 \text{ moles/hr flue gas}) = 0.02844 \text{ moles/hr NH}_3$

Thus —> 0.02844 moles/hr NOx in HRSG from NOx leakage, in terms of 1000 gals of fuel

$$\frac{(0.02844 \text{ mol/hr NOx}) \times (46.01 \text{ lb/mol} \times 1000)}{94.8 \text{ gal/hr Fuel to HRSG}} = 13.8 \text{ lb NOx/1000 gal HRSG Fuel}$$

**2) NOx contribution from HRSG burner**

Basis - Diesel Exhaust Study - 4/29/94 (excerpt attached as 4.5.1 in 5/2/95 letter to Mr. Eng)

From Study —> 0.150 lb NOx/MMbtu

$$\frac{0.150 \text{ lbs NOx}}{1,000,000 \text{ btu}} \times \frac{136,000 \text{ btu}}{1 \text{ gal}} \times 1000 \text{ gal} = 20.4 \text{ lbs NOx/1000 gals}$$

**3) NOx contribution from HRSG unit**

$$13.8 + 20.4 = 34.2 \text{ lbs/1000 gal}$$

FROM COEN CO 1994

Attachment  
to EPA

## EMISSION CONVERSIONS

convert LB/100 → PPM

NOX →	NATURAL GAS $3\% \text{ O}_2: \#/\text{MKB} * 833 = \text{PPM}$ OIL <sup>10% BTU INPUT</sup> $\#2: 3\% \text{ O}_2: \#/\text{MKB} * 775 = \text{PPM}$ $\#6: 3\% \text{ O}_2: \#/\text{MKB} * 761 = \text{PPM}$	NOX
CO	NATURAL GAS $3\% \text{ O}_2: \#/\text{MKB} * 1368 = \text{PPM}$ OIL $\#2: 3\% \text{ O}_2: \#/\text{MKB} * 1275 = \text{PPM}$ $\#6: 3\% \text{ O}_2: \#/\text{MKB} * 1262 = \text{PPM}$	CO
UBHC/ VOC	NATURAL GAS $3\% \text{ O}_2: \#/\text{MKB} * 2395 = \text{PPM}$ OIL $\#2: 3\% \text{ O}_2: \#/\text{MKB} * 2228 = \text{PPM}$ $\#6: 3\% \text{ O}_2: \#/\text{MKB} * 2188 = \text{PPM}$	UBHC/ VOC
SOX	NATURAL GAS $3\% \text{ O}_2: \#/\text{MKB} * 598 = \text{PPM}$ OIL $\#2: 3\% \text{ O}_2: \#/\text{MKB} * 557 = \text{PPM}$ $\#6: 3\% \text{ O}_2: \#/\text{MKB} * 547 = \text{PPM}$	SOX

## **Section 3.2**

### **Support Documentation for USEPA PSD Non-Applicability Determination**



*File*  
*C*

**CUSTODIO, SUAREZ & ASSOCIATES**  
ARCHITECTS, ENGINEERS, PLANNERS & CONSTRUCTION MANAGERS  
Mercantil Plaza, Mezzanine Suite, San Juan, P.R. 00918 (809) 754-6800, Fax 753-7330

# TRANSMITTAL LETTER

<b>PROJECT:</b> Pfizer Cogeneration Project		<b>DATE:</b> 4/25/95	<b>WORK ORDER:</b> 7178-125
---	--	----------------------	-----------------------------

<b>TO:</b>	Pfizer Pharmaceuticals, Inc.	<b>SUBJECT:</b> New submittals for
	Barceloneta, PR	PSD Non-Applicability
		Determination
<b>ATTN:</b>	Mr. Ron Massey	

ITEM	COPIES EACH	DATE	DESCRIPTION
1	1	4/21/95	ENSR Report Attachment 1.0 - revised
2	1	4/21/95	ENSR Report Attachment 2.0 - revised
3	1	6/15/94	Letter from EPA
4	1	-	Reply to EPA Question 1
5	1	-	Reply to EPA Question 2
6	1	4/18/95	Reply to EPA Question 3
7	1	-	Caterpillar Emissions Measurement Procedure
			Copies:
			Mr. Carlos Lopez

**The items are submitted:**

☐ for Your Comment  
☐ for your approval  
☐ for your final approval  
☐ for your files  
☐ for estimate  
☐ for fabrication  
☐ approved for construction  
☒ as requested  
☐ \_\_\_\_\_

**REMARKS** This package is what was sent to  
Mike Mahoney  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**PREPARED BY:** Jay W. Landwehr  
 Jay Landwehr

**RECEIVED BY:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

COPY

## Attachment 1.0 - PPI Utility Plant Expansion - Air Emissions Summary Table

One permit filed for new package boiler, diesel engines and heat recovery boiler  
 Peak steam 60,000 lb/hr  
 Average steam 35,000 lb/hr  
 Permit-Proposed Conditions  
 - existing boilers removed after project completed  
 - can run new boiler and HRSG simultaneously to meet peak  
 (19,200 from fuel combustion, 15,800 from engine heat recovery)

can run new boiler and HRSG simultaneously to met peak																							
Unit	Status	Steam lbs/hr	Output	Units	Fuel % S	Fuel Use (gal/hr)	Hrs/ Year	Fuel Use (gal/yr)	NOx Control (note-1)	Emission Factors (lbs/1000 gals) (after control if present)					Emissions (Tons/yr)								
										NOx (note-2)	SO2 (note-3)	CO (note-4)	HC (note-5)	PM (note-6)	PM10 (note-7)	Pb (note-8)	NOx	SO2	CO	HC	PM	PM10	Pb
New Engine 1	N	(3700)	1600	KW	0.2	112	7500	840000	97.5	17.64	28.01	22.10	4.07	2.68	2.14	0.0012	7.41	11.76	9.28	1.71	1.12	0.90	0.00050
Engine 2	N	(3700)	1600	KW	0.2	112	7500	840000	97.5	17.64	28.01	22.10	4.07	2.68	2.14	0.0012	7.41	11.76	9.28	1.71	1.12	0.90	0.00050
Engine 3	N	(3700)	1600	KW	0.2	112	7500	840000	97.5	17.64	28.01	22.10	4.07	2.68	2.14	0.0012	7.41	11.76	9.28	1.71	1.12	0.90	0.00050
Engine 4	N	(3700)	1600	KW	0.2	112	7500	840000	97.5	17.64	28.01	22.10	4.07	2.68	2.14	0.0012	7.41	11.76	9.28	1.71	1.12	0.90	0.00050
Engine 5	N	(3700)	1600	KW	0.2	112	7500	840000	97.5	17.64	28.01	22.10	4.07	2.68	2.14	0.0012	7.41	11.76	9.28	1.71	1.12	0.90	0.00050
HR Boiler	N	11200	1.29E+07	Btu/hr	0.2	95	8760	829209	lownox	34.24	28.40	5.00	0.20	2.00	1.00	0.0012	14.20	11.77	2.07	0.08	0.83	0.41	0.00050
New Boiler	N	18400	2.16E+07	Btu/hr	0.2	159	3800	604844	lownox	13.60	28.40	5.00	0.20	2.00	1.00	0.0012	4.11	8.59	1.51	0.06	0.60	0.30	0.00036
Totals-->						814	50060	5634053								Potential Emissions-->	55.34	79.18	49.99	8.69	7.06	5.21	0.00339
Existing Boiler 1- (13500 lbs/hr)	E	6433	7.04E+10	btu/yr	1.421			(note-9) 468486	none	55.00	223.1	5.00	0.28	16.28	14.00	0.0169	12.83	52.03	1.17	0.07	3.80	3.28	0.00394
Boiler 2- (13500 lbs/hr)	E	6433	7.04E+10	btu/yr	1.421			468486	none	55.00	223.1	5.00	0.28	16.28	14.00	0.0169	12.83	52.03	1.17	0.07	3.80	3.28	0.00394
Actual Avg (Jan 93-Dec 94)-->		12865.6						932972								Actual Emissions-->	25.66	104.1	2.33	0.13	7.59	6.53	0.00788
PSD Evaluation										Potential Emissions-->							Actual Emissions-->						
										55.34 79.18 49.99 8.69 7.06 5.21 0.00339							25.66 104.1 2.33 0.13 7.59 6.53 0.00788						
										Difference (Potential-Actual)-->							29.69 -24.88 47.66 8.56 -0.54 -1.32 -0.00450						
										PSD Significance Levels-->							40.0 40.0 100.0 40.0 25.0 15.0 0.8						

## Attachment 2.0 PPI Utility Expansion - 1992/1993 Fuel Consumption

Month	Year	Fuel Use (GALS)	Fuel % S	Emissions (TPY)		
				SO2 (see note 1)	PM (see note 2)	PM10 (see note 3)
January	1993	82800	1.45	9.42	0.68	0.59
February	1993	66958	1.16	6.10	0.46	0.40
March	1993	82881	1.27	8.26	0.62	0.53
April	1993	81564	1.48	9.48	0.69	0.59
May	1993	80826	1.68	10.66	0.75	0.65
June	1993	81922	1.60	10.29	0.73	0.63
July	1993	71590	1.70	9.55	0.67	0.58
August	1993	79850	1.65	10.34	0.73	0.63
September	1993	83999	1.61	10.62	0.76	0.65
October	1993	97984	1.61	12.38	0.88	0.76
November	1993	93949	1.64	12.09	0.86	0.74
December	1993	71437	1.62	9.08	0.65	0.56
1993 total		975760	1.54	118.29	8.49	7.31
January	1994	63728	1.51	7.55	0.54	0.47
February	1994	82928	1.56	10.16	0.73	0.63
March	1994	88495	1.52	10.56	0.76	0.65
April	1994	85755	1.26	8.48	0.63	0.55
May	1994	70948	1.26	7.02	0.52	0.45
June	1994	65548	1.17	6.02	0.46	0.39
July	1994	73723	1.12	6.48	0.50	0.43
August	1994	72558	1.10	6.27	0.48	0.42
September	1994	68693	1.09	5.88	0.45	0.39
October	1994	74577	1.31	7.67	0.57	0.49
November	1994	80672	1.27	8.04	0.60	0.52
December	1994	62559	1.16	5.70	0.43	0.37
1993 total		890184	1.29	89.82	6.69	5.75
1993/1994 avg		932972	1.421	104.05	7.59	6.53

### Notes

1-USEPA 7/93 Emission factors-table 1.3-2

2-USEPA 7/93 Emission factors-table 1.3-2

3-USEPA 7/93 Emission factors-table 1.3-6

4-Fuel use and % S from EQB Monthly reporting forms

PSDNAD1C

4/21/95



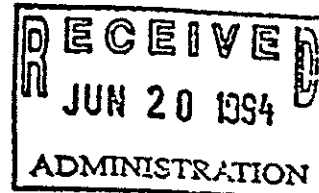
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

JACOB K. JAVITS FEDERAL BUILDING

NEW YORK, NEW YORK 10278-0012

JUN 15 1994



Mr. Natale S. Ricciardi  
Vice President and Director, P.R. Operation  
Pfizer Pharmaceuticals, Inc.  
P.O. Box 628  
Barceloneta, Puerto Rico 00617

Re: PSD Non-Applicability Determination  
Utility Plant Expansion

Dear Mr. Ricciardi:

The U.S. Environmental Protection Agency (EPA), Region II Office, has reviewed the Pfizer Pharmaceutical, Inc. (PPI) April 20, 1994 Prevention of Significant Deterioration of Air Quality (PSD) non-applicability request. The submittal was reviewed for applicability pursuant to the PSD regulations codified at 40 C.F.R. § 52.21. Based on the information provided, EPA cannot make a determination at this time due to insufficient information. In order for EPA to continue its review, PPI must provide the following information:

- Jay ✓*
1. Explain in detail how the NO<sub>x</sub> emission factor for the diesel engines in Attachment 1.0 (19.74 lbs/1000 gal) was determined. Show complete calculations and identify all assumptions made.
  - Ho Sam 1/8/94*  
2. Explain in detail how the exhaust emissions data for the diesel engines were determined. Specify the percent of time each engine would operate at "prime" or "standby" as referenced in Attachment 1.1.1 "Exhaust Emissions Data Sheet." Substantiate with calculations.
  - Peer 6/20*  
3. Submit test data for the NO<sub>x</sub> SCR control equipment. Actual data obtained from a comparable facility using such equipment may also be submitted.
  - PPI {*  
4. Have there been any increases or decreases in NO<sub>x</sub> emissions at the facility (plant-wide) within the last five years? If yes, identify the date the increase or decrease in emissions occurred and quantify the emissions (include calculations). Include the source of the emissions data.

## NC-300<sup>®</sup> Catalyst Installation

**Project** Plymouth State College Cogeneration Plant  
**Client** Northern Peabody, Inc.  
**Source** Mirreless Blackstone ESL-9 Diesel Engine  
**Location** Plymouth State College, Plymouth, New Hampshire  
**Start Up** November 1993

### Description:

A Mirreless Blackstone ESL-9 diesel engine, rated at 1200 kW/1600 bhp will run on No. 6 Heavy Fuel Oil in a combined heat and power plant operated by Plymouth State College. This base loaded cogeneration plant is expected to run continuously and the Norton NC-300 SCR system must reduce NO<sub>x</sub> by 95% in order to meet the 25 ton/year NO<sub>x</sub> output limit set on the plant by the New Hampshire regulatory authorities. The Norton NC-300 SCR system will use aqueous ammonia.

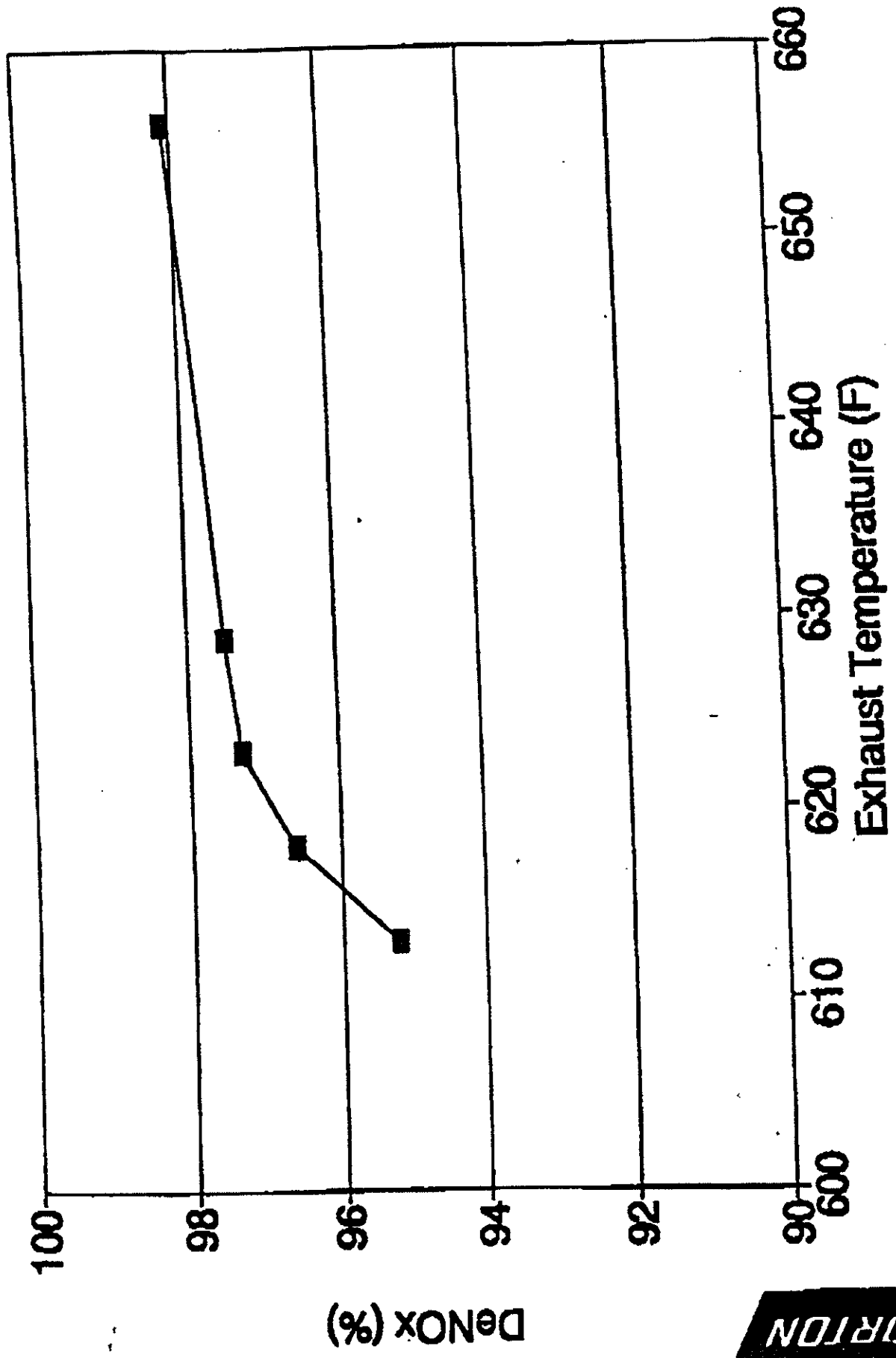
### Process Design:

Flue Gas Flow Rate	23,760	(%)	10,780	(%)
Operating Temperature	750	(°F)	400	(°C)
Inlet NO <sub>x</sub>	1442	(ppmv @ 15% O <sub>2</sub> )	2980	(mg/Nm <sup>3</sup> @ 15% O <sub>2</sub> )
Outlet NO <sub>x</sub>	72.1	(ppmv @ 15% O <sub>2</sub> )	148	(mg/Nm <sup>3</sup> @ 15% O <sub>2</sub> )
NO <sub>x</sub> Removal Efficiency	95	(%)	95	(%)
Ammonia Slip	<15	(ppmv @ 15% O <sub>2</sub> )	<11.4	(mg/Nm <sup>3</sup> @ 15% O <sub>2</sub> )
SO <sub>2</sub> Concentration	550	(ppmv @ 15% O <sub>2</sub> )	1571	(mg/Nm <sup>3</sup> @ 15% O <sub>2</sub> )
Pressure Drop	<3.8	(inch H <sub>2</sub> O)	<0.8	(mm H <sub>2</sub> O)
Reducing Agent	Aqueous Ammonia			



# No. 6 OIL-FIRED 1200kW DIESEL ENGINE

## Norton SCR System Operating Data



## **CATERPILLAR, INC.**

### **DIESEL ENGINE EMISSIONS MEASUREMENT PROCEDURE**

The Measurement Procedures used to obtain the emissions values are consistent with those described in EPA CFR 40 Part 86 Subpart D and ISO 8178-1 for measuring HC, CO, CO<sub>2</sub> and NO<sub>x</sub>. These procedures are very similar to the methods described in EPA CFR 40 Part 60 Appendix A Method 25A for HC, Method 10 for CO, Method 7E for NO<sub>x</sub>.

ISO 8178-1 is used for particulate matter measurement.

The particulate matter measurement method is not the same as the EPA Method. The EPA uses several methods for measuring particulate matter in the field, the most common being Method 5. Method 5 is prone to errors and is very time consuming and costly to use. Very few engine laboratories are equipped to measure particulate matter with Method 5.

Caterpillar measures particulate matter with a micro-dilution tunnel system. The system follows ISO 8178-1 procedures and will be used by Caterpillar to certify engines for nonroad applications for both CARB and USEPA beginning in 1996.

Particulate matter data obtained with the micro-dilution system is marked "MD" in the particulate matter column. For cases where Caterpillar does not have micro-dilution particulate matter data, the particulate matter is calculated from a smoke to particulate matter correlation. If this method is used, an "S" appears in the particulate matter column.

Method 5 can be used to measure particulate matter in two ways. The first requires a front-half wash. This means that the sampling system from the stack to the filters must be flushed with solvent and the extract weighed. When this procedure is used, the results of Method 5 can be slightly less than results obtained with the ISO procedure. This is because the filter temperature used in Method 5 is higher than the filter temperature used in the ISO procedure. The lower filter temperature of micro-dilution condenses more soluble organic matter and thus gives a higher particulate matter weight than Method 5.

The second way to use Method 5 requires a front and back-half wash. If this procedure is used, additional organic fractions are condensed after the filter by passing the sample through a condenser with an outlet gas temperature of 20 degree C (68 degree F). With this procedure, many of the engine's hydrocarbons will be measured as particulate matter. For air permitting purposes, if a back-half wash is to be used in a stack test, the hydrocarbons produced by the engine should be added to the particulate matter number. Tests that require a back-half wash with Method 5 may also be influenced by the fuel sulfur level. To be safe, if any form of Method 5 is to be used in the field test, call the Engine Division for guidance.

Before any stack test is run, EDS 81.0 should be consulted for proper stack conditioning and an assessment of Method 5 accuracy.

Method 5 is a complicated test and can easily produce poor results if the contractor is not extremely competent. The engine data presented in TMI is for an engine that has had some reasonable break-in period. This can range from 40 to 80 hours. A proper break-in period will improve field measurement results.

Attached is the exhaust emission data requested. The data was obtained through actual engine tests on an engine of similar configuration to yours. Emission data measurement is consistent with EPA methods described in CFR 40 Part 86 Subpart D and ISO 8178-1 for HC, CO, CO<sub>2</sub> and NO<sub>x</sub>. The particulate matter was measured using ISO procedure 8178-1. (If the letter "S" appears in the particulate matter column, substitute this sentence for the previous sentence: Particulate matter information was derived from a smoke to particulate matter correlation.) The fuel used was No. 2 diesel with 35 degree API and LHV of 42,783 KJ/KG (18,390 BTU/LB). The data are based on steady-state operating conditions with inlet air conditions of 25 degree C (77 degree F), 96 KPA (28.42 in.Hg.abs.).

The NO<sub>x</sub> shown is not actually present in the exhaust. It is based on the assumption that all the NO and NO<sub>2</sub> in the exhaust is converted to NO<sub>2</sub> in the atmosphere. The NO<sub>x</sub> is reported with a molecular weight equal to NO<sub>2</sub> and is corrected for 75 grains/lb. engine inlet air humidity.

The SO<sub>x</sub> value is based on a fuel sulfur content of 0.2 percent by weight.



ENSR Consulting  
and Engineering

35 Nagog Park  
Acton, MA 01720  
(508) 635-9500  
FAX (508) 635-9180

April 7, 1994

Mr. Michael Mahoney  
Pfizer, Inc.  
235 East 42nd Street  
New York, NY 10017

Re: Transmittal of PSD Non-Applicability Determination for Pfizer Pharmaceuticals Facility  
in Barceloneta, Puerto Rico

Dear Mike:

Enclosed please find six (6) copies of the final PSD Non-Applicability Determination for Pfizer Pharmaceuticals Barceloneta, Puerto Rico facility. As you requested I have also sent one (1) copy of the document directly to Mr. Carlos Lopez in Puerto Rico via overnight.

This document reflects ENSR's review of the emission factors and calculation methods used to develop both the facilities actual emissions and the potential emissions associated with the new utility plant. ENSR has included the updated tables and vendor information which was provided in response to your telephone conversation with John Kingsley on Wednesday, April 7, 1994.

If you have any questions, please do not hesitate to call John Kingsley or myself at (508) 635-9500.

Sincerely yours,

A handwritten signature in cursive script that reads "John Kingsley for".

Anthony Colella  
Senior Project Manager

Enclosures

ENSR Reference No. 5400-016  
ENSR Document No. 04AQS012.AC

cc: John Kingsley/ENSR  
Carlos Lopez/Pfizer

**Pfizer Pharmaceuticals, Inc.**

**Barceloneta, Puerto Rico**

**PSD Non-Applicability  
Determination for the  
Utility Plant Expansion at  
Pfizer's Barceloneta Facility**

**ENSR Consulting and Engineering**

**April 1994**

**Document Number 5400-016-400**

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- 1.1 NOx Emission Factors
- 1.2 CO Emission Factors
- 1.3 HC Emission Factors
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## 1.0 INTRODUCTION

Pfizer Pharmaceuticals, Inc. (PPI) operates a pharmaceutical manufacturing facility in Barceloneta, Puerto Rico. PPI is planning to expand the utility plant at this facility to:

- reduce dependence on the island utility (PREPA) for electric power;
- provide backup for current plant steam needs and allow for future plant growth;
- provide necessary steam to undertake planned waste minimization initiatives;
- improve efficiency of energy use at the facility;
- end reliance on older, less efficient boilers for steam;
- provide emergency power capabilities; and
- reduce the cost of energy.

In May of 1993, PPI met with Francisco Claudio of the Environmental Quality Board (EQB) to discuss the project and to develop a plan to proceed with air quality construction permitting of the expansion. Mr. Claudio suggested that PPI perform an applicability analysis to determine if the utility plant expansion would be subject to PSD review and obtain concurrence from EPA as to the regulatory applicability of the project. Therefore, PPI is submitting this PSD applicability analysis to EPA for review and concurrence. The results of the applicability analysis show that emissions of SO<sub>2</sub> will decrease compared to the baseline period and the increase in emissions of the other PSD regulated pollutants will be considerably less than the Significant Levels. PPI has thus concluded and request EPA's concurrence that the utility plant expansion will not be subject to PSD review.

### 1.1 Project Description

#### 1.1.1 Existing Utility Plant

The existing utility plant at the PPI facility consists of two Superior boilers rated at 16.7 MMBtu/hr heat input each with a maximum steam producing capacity of 13,800 lbs/hr each. The boilers were installed in 1972 and are permitted to burn residual fuel oil. During the baseline period, the

sulfur content of the fuel oil averaged 1.57 percent. These two boilers have been supplying the steam needs of the facility over its operational life. The facility's electric needs have been met by purchasing power from PREPA.

### **1.1.2 Need for Utility Plant Expansion**

The two existing boilers are able to satisfy the average steam demand of the facility. The current peak steam demand of the PPI facility has reached the capacity of the existing boilers. The potential near term future peak is projected at 30,200 lb/hr. This peak will require PPI to curtail solvent recovery operations. Maximizing solvent recovery is the cornerstone of PPI's waste minimization efforts. Increased steam is necessary to maintain the reliability of PPI's current and planned future waste minimization efforts.

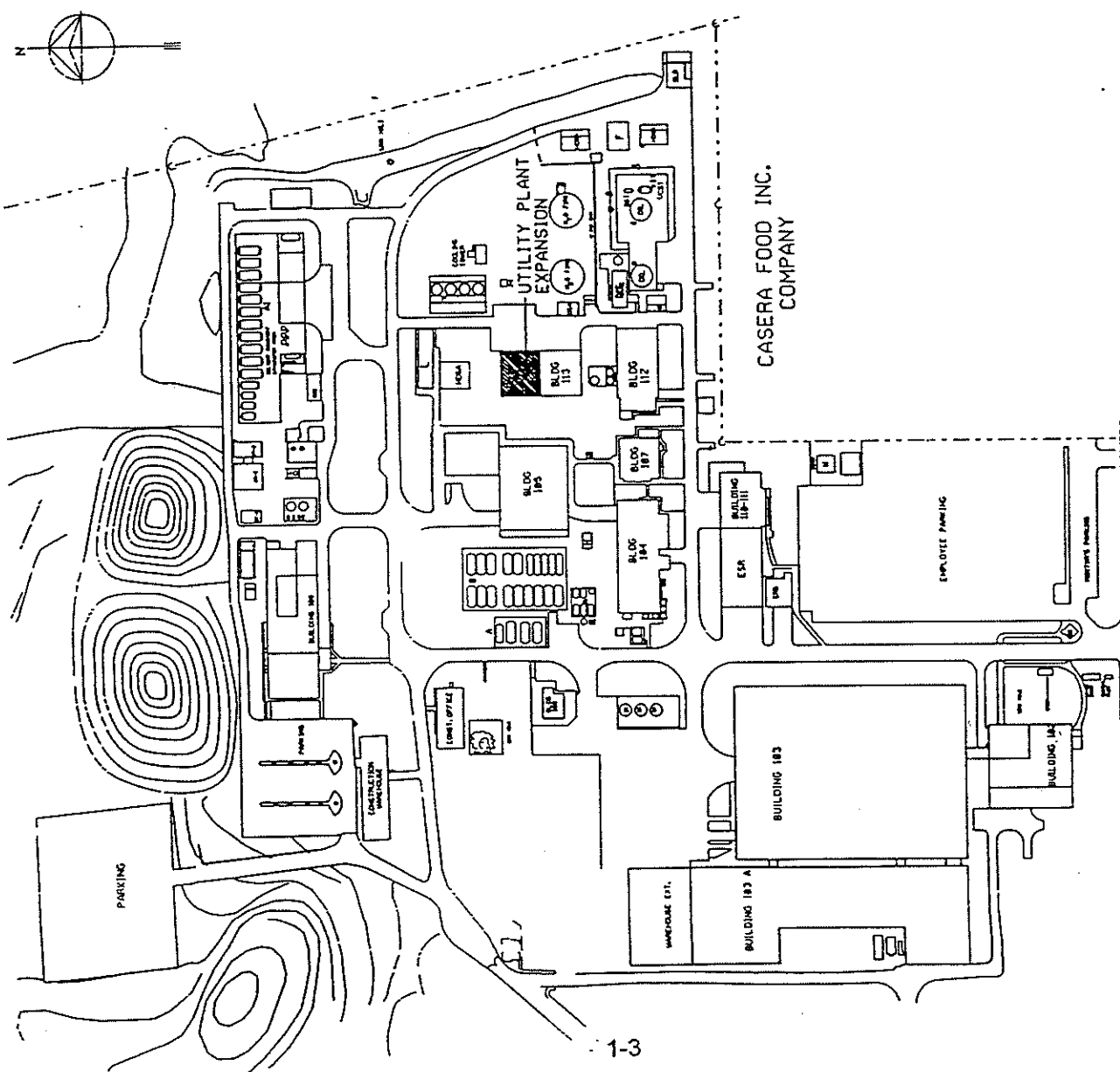
In addition to the steam required for waste minimization, PPI is planning future projects for the Barceloneta facility which will have a total connected steam load of approximately 38,000 lbs/hr. Expansion of the utility plant is required to meet this future steam demand. In addition, there is currently no backup steam capacity which is becoming a significant concern given the age of the existing boilers.

### **1.1.3 Utility Plant Expansion Project**

The utility plant expansion consists of decommissioning and removing the two existing Superior boilers and installing the following equipment to meet the Barceloneta facility's steam and electric needs. Figure 1-1 shows the proposed location of the utility system.

#### Diesel Generators

PPI plans to install five 1,500 KW diesel engine electric generators which will burn low sulfur (0.2 percent) number 2 fuel oil or diesel fuel. Figure 1-2 shows the basic layout of the proposed system. Each individual engine will be equipped with a Selective Catalytic Reduction (SCR) unit for NO<sub>x</sub> control. The exhaust from these individual engine/SCR units will then be ducted to a common SCR unit. An overall reduction in NO<sub>x</sub> emissions of 97 percent is expected to be achieved using this dual SCR configuration and will be verified through continuous emission monitoring. PPI plans to operate the diesels simultaneously to produce a total of 7,500 KW of electricity. Given power outages and voltage dips, and their resulting disruption of facility operations experienced over the last five years, PPI believes that installation of the diesels is crucial to future plant operations. Generation of electricity on-site is also expected to be less costly than continuing to purchase power from PREPA. PPI will maintain a connection to PREPA.



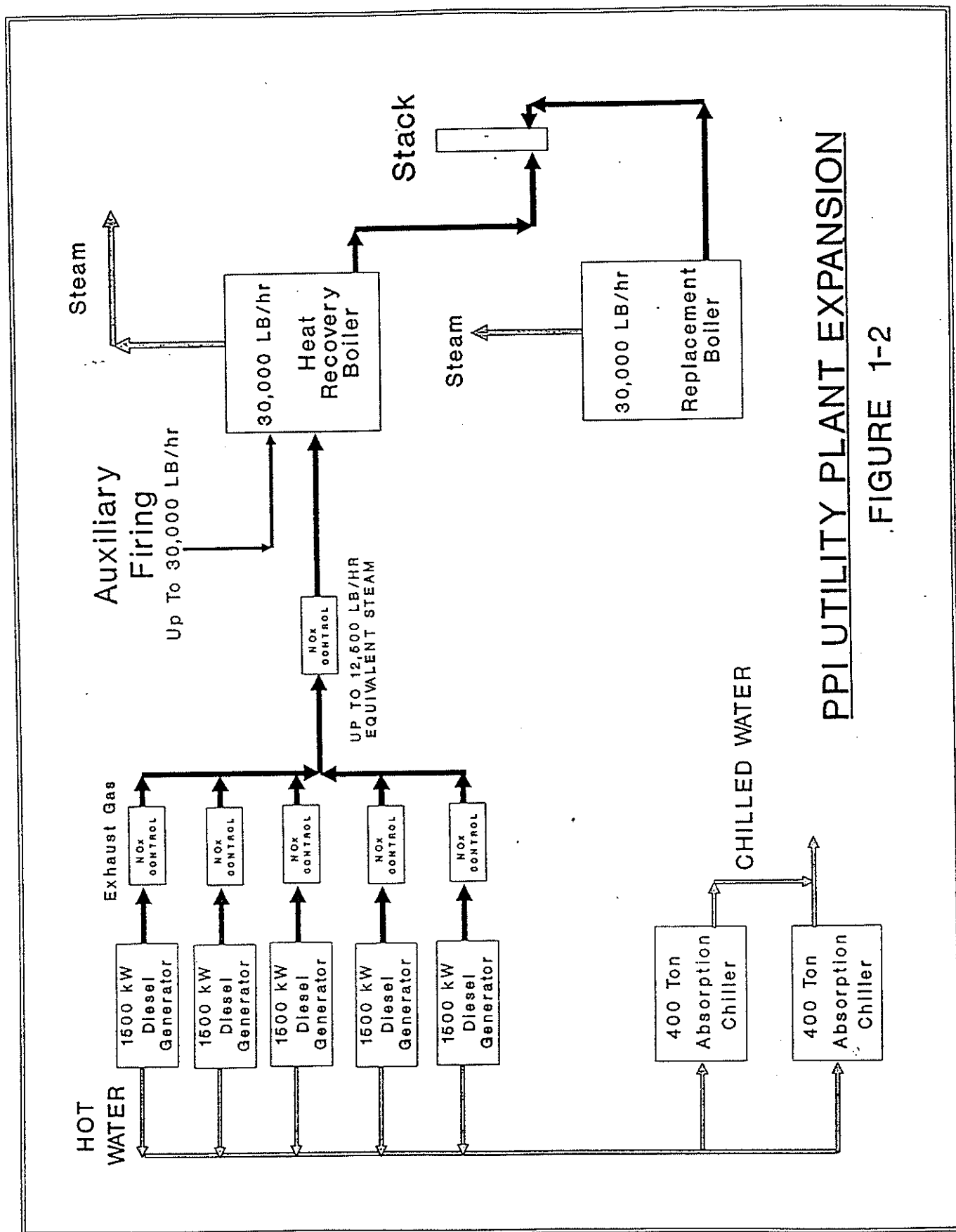
**LEGEND:**

- 181 - GUANO HOUSE
- 182 - AQA BUILDING
- 183A - PACKAGING BUILDING
- 184 - PROCESSING BUILDING
- 185 - ORGANIC SYNTHESIS
- 186 - ORGANIC WAREHOUSE
- 187 - HYDROGENATION
- 188 - ORG. SYNTHESIS OFFICES
- 189 - ORGANIC SYNTHESIS
- 118-111 - ENG. & MAINT. SHOP
- 112 - POWER HOUSE
- A - ABOVE GROUND LIQUID STORAGE
- AI - NEW ABOVE GROUND TANK FARM
- B - UNDERGROUND TANK FARM
- BP - BATH PIT
- D - FUEL OIL STORAGE
- E - COOLING TOWERS
- F - INCINERATOR
- G - GASOLINE TANK
- GS - GAS. HCL CYLINDERS
- H - ELECTRICAL SUBSTATION
- P - BIOGAS EFFLUENTS PIT
- J - ARTESIAN WELL
- JI - SHALLOW WELL
- K - H<sub>2</sub>O TANK
- L - 1950 IF FREEZERS
- M - CONDENSERS STORAGE
- IB - INCINERATOR BATHROOM
- PB - PIPE BRIDGE
- NT - NEUTRALIZATION TANK
- ES - STOCK ROOM
- MSA - MALARIOUS DRUG STORAGE
- MSA - DRUG STORAGE AREA
- CS1 - CAUSTIC STORAGE TANK
- CS2 - SPENT SOLVENT STORAGE TANK
- RS1 - KEROSENE STORAGE TANK
- DLA - DRUGS LOADING RAMP

Figure 1-1

Proposed Location of  
Utility Plant Expansion

Pfizer Pharmaceuticals, Inc.	
SITE PLAN	
Drawing of Proposed	
TO BARCELONA	
181	GUANO HOUSE
182	AQA BUILDING
183A	PACKAGING BUILDING
184	PROCESSING BUILDING
185	ORGANIC SYNTHESIS
186	ORGANIC WAREHOUSE
187	HYDROGENATION
188	ORG. SYNTHESIS OFFICES
189	ORGANIC SYNTHESIS
118-111	ENG. & MAINT. SHOP
112	POWER HOUSE
A	ABOVE GROUND LIQUID STORAGE
AI	NEW ABOVE GROUND TANK FARM
B	UNDERGROUND TANK FARM
BP	BATH PIT
D	FUEL OIL STORAGE
E	COOLING TOWERS
F	INCINERATOR
G	GASOLINE TANK
GS	GAS. HCL CYLINDERS
H	ELECTRICAL SUBSTATION
P	BIOGAS EFFLUENTS PIT
J	ARTESIAN WELL
JI	SHALLOW WELL
K	H <sub>2</sub> O TANK
L	1950 IF FREEZERS
M	CONDENSERS STORAGE
IB	INCINERATOR BATHROOM
PB	PIPE BRIDGE
NT	NEUTRALIZATION TANK
ES	STOCK ROOM
MSA	MALARIOUS DRUG STORAGE
MSA	DRUG STORAGE AREA
CS1	CAUSTIC STORAGE TANK
CS2	SPENT SOLVENT STORAGE TANK
RS1	KEROSENE STORAGE TANK
DLA	DRUGS LOADING RAMP



PPI UTILITY PLANT EXPANSION

FIGURE 1-2

---

### Heat Recovery Steam Generator

Exhaust gas from the diesel engines will be used to produce steam in the heat recovery steam generator (HRSG). The HRSG will have a total steam generating capacity of 30,000 lbs/hr of which up to 12,500 lbs/hr will be generated from the diesel engine exhaust with the remainder generated by supplemental firing of low sulfur (0.2 percent) number 2 fuel oil or diesel fuel. The HRSG will be designed to produce up to 30,000 lbs/hr steam by supplemental firing alone for periods when the diesel engines are down for maintenance. The HRSG will incorporate a low-NO<sub>x</sub> burner.

### Package Boiler

The package boiler will have a total steam capacity of 30,000 lbs/hr which will be generated by firing of low sulfur (0.2 percent) number 2 fuel oil or diesel fuel. Like the HRSG, the package boiler will incorporate a low-NO<sub>x</sub> burner. PPI is planning to operate the new package boiler and HRSG in any combination provided its proposed fuel cap is not exceed. This is discussed further in Section 3.1 of this document.

## 1.2 Project Schedule

The EQB has suggested that PPI obtain EPA's concurrence that the utility plant expansion is not subject to PSD review. After concurrence from EPA and approval from EQB on the construction permit, PPI will immediately begin constructing the expanded utility. Design and construction is not as complicated for the package boiler as it is for the five diesels engines and HRSG. Therefore, within six months of EQB's approval, PPI will install and begin operation of the package boiler. The diesel engines and HRSG are expected to become operational within 12 to 18 months of EQB's approval. When the package boiler becomes operational, one of the two existing boilers will continue to be used for steam generation. The other boiler will be idle. When the entire expansion project is operational, both of the existing boilers will be decommissioned and removed.

## 1.3 Results of Applicability Analysis

PPI has determined the potential emissions from the new equipment and the actual average emissions from the existing boilers during the two years prior to this submittal. Subtracting the actual average emissions from the potential emission yields the net change which is compared with the PSD Significant Emission Rates. The results of the applicability analysis which are listed in Table 1-1 show that the net change in emissions is less than the PSD Significant Emission

TABLE 1-1

Net Change in Emissions from the PPI  
Utility Plant Expansion Project

Pollutant	Net Change in Emissions (tpy)	Significant Emission Rates (tpy)
SO <sub>2</sub>	-25.58	40
NO <sub>x</sub>	28.82	40
CO	22.95	100
HC	5.71	40
PM	3.76	25
PM-10	1.71	15
Pb	-0.00402	0.6

Rates. PPI therefore concludes and requests EPA's concurrence that the utility expansion project is not subject to PSD review.

#### **1.4 Project Environmental Benefits**

The utility expansion project will result in a decrease in SO<sub>2</sub> emissions compared to baseline levels. This will be achieved through the combustion of low sulfur fuels to generate energy. This is very positive as the EQB has targeted SO<sub>2</sub> emissions for analysis and potential reduction in the Barceloneta area.

Solvent recovery is the corner stone of PPI's waste minimization efforts. The utility expansion project will insure that adequate steam is available for solvent recovery allowing PPI to recover large volumes of solvents that would otherwise need to be managed offsite.

The existing boilers are currently vented by two 32 foot stacks which are less than the GEP height<sup>1</sup> of 55 feet. The new equipment will be vented by a GEP stack thus resulting in an improvement in air quality in the vicinity of the facility.

The utility expansion project will allow PPI to generate up to 7,500 KW of energy that otherwise would have to be generated by PREPA. Pfizer will produce the energy using environmentally cleaner generation technology than is used by PREPA, i.e., low sulfur fuel and NO<sub>x</sub> pollution control technology that possibly represents the lowest achievable emission rate (LAER) technology for diesel engines. The controlled NO<sub>x</sub> emissions coupled with more efficient use of energy will result in a significant reduction of all pollutants on an island wide basis.

#### **1.5 The Applicant**

The applicant for this facility modification is:

Pfizer Pharmaceuticals, Inc.  
Route # 2 Km 58.2 PO Box 628  
Barceloneta, PR 00617  
809-846-4300

The plant person to be contacted regarding this modification is Mr. Carlos Lopez.

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<sup>1</sup>Based on the facility's current building configurations.

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Pfizer's corporate contact for this modification is:

Mr. John S. Keith  
Manager  
Environmental Assurance & Planning  
Pfizer Inc.  
235 East 42nd Street  
New York, NY 10017-5755  
(212) 573-3157

PPI has retained ENSR Consulting and Engineering to assist in the preparation of the PSD non-applicability analysis. Mr. Anthony Colella is the ENSR project manager for this effort. His address and telephone number are:

ENSR Consulting and Engineering  
35 Nagog Park  
Acton, MA 01720  
(508) 635-9500

## **1.6 Report Contents**

Section 2 of this report contains an overview of the PSD program, including a discussion of how "net" emission change is determined and a discussion of NSPS applicable to the new equipment. Section 3 presents the calculation of potential to emit for the new equipment, determination of average actual emissions and the calculation of the net emissions change. Materials which support the information presented in this reported are included as attachments.

## 2.0 REGULATORY OVERVIEW

The controlling regulations in this analysis are PSD and New Source Performance Standards (NSPS). The PSD regulations prevent the degradation of air quality in clean air areas, while NSPS set emission restrictions on new or reconstructed units.

### 2.1 PSD Program

The primary goal of the PSD program is to ensure that air quality in areas designated as attaining the air quality standards does not significantly deteriorate, while still maintaining a margin for future industrial growth. Proposed major new sources and major modifications in these areas are subject to PSD review. New major sources and major modifications subject to the PSD regulations must meet certain preconstruction review requirements including:

- Best Available Control Technology (BACT) evaluations;
- air quality impact analyses; and
- additional impact analyses.

The EQB has designated various areas of Puerto Rico as either attainment or nonattainment for each criteria pollutant, SO<sub>2</sub>, particulate matter (PM), particulate matter less than 10 microns in diameter (PM-10), NO<sub>x</sub>, CO, ozone, and lead. The Barceloneta area has been designated as either attainment or unclassified for all criteria pollutants, consequently, PSD regulations could potentially apply.

If it can be demonstrated that increased emissions are less than the PSD Significant Emission Rates (see Table 1-1) for any regulated pollutant, PSD review will not be required. The pollutants of concern in this analysis are PM, PM-10, SO<sub>2</sub>, NO<sub>x</sub>, CO, lead, and Hydrocarbons (HC) which are regulated as precursors to ozone formation.

Whether a significant emission increase will result from a proposed modification, such as the utility expansion project at the PPI facility in Barceloneta, is determined by the net change in actual emissions. In assessing the net change, certain contemporaneous emission changes may be considered with the increase from the modification. All contemporaneous changes are assessed as actual emissions. Changes resulting in emissions reduction will generally be

credited on the basis of the difference in the emission units' actual emissions before and after the reduction.

## **2.2 NSPS Program**

The NSPS are a set of national emission standards for both criteria and designated pollutants from new, modified, or reconstructed sources (40 CFR Part 60). A discussion of NSPS applicability relative to the utility plant expansion project is provided below.

### **2.2.1 Diesel Engines**

EPA has not established NSPS for internal combustion engines. Nevertheless, emissions from the engines will be minimized by the combustion of low sulfur fuel and the use of a dual SCR system to control NO<sub>x</sub> emissions. This dual SCR system could potentially be considered to represent LAER technology for diesel engines.

### **2.2.2 HRSG and Package Boiler**

On June 9, 1989 the EPA proposed NSPS for new, modified, or reconstructed small industrial-commercial-institutional steam generating units with a maximum heat input rate of 100 MMBtu/hr or less but greater than or equal to 10 MMBtu/hr (Subpart Dc). These regulations were promulgated on September 12, 1990. The heat input to the HRSG and package boiler are approximately 36 MMBtu/hr. Thus, these emission units will be subject to the NSPS for small industrial-commercial-institutional steam generating units.

The NSPS restricts SO<sub>2</sub> emissions from oil-fired steam generating units between 10 and 100 MMBtu/hr capacity to 0.5 lbs SO<sub>2</sub> per MMBtu or, as an alternative, limits the maximum sulfur content of the fuel combusted to 0.5 percent. Since both the HRSG and package boiler will be burning oil with a maximum sulfur content of 0.2 percent, they will comply with NSPS.

The NSPS for particulates for oil-fired units with heat inputs of 30 MMBtu/hr or greater limits the opacity of the exhaust gas to 20 percent based on a six-minute average, except for one six-minute period per hour of not more than 27 percent opacity. The NSPS states that these opacity standards do not apply during periods of start up, shutdown, or malfunction.

Notification of the date of construction and start up of the units will be made to the USEPA as required in 40 CFR § 60.7.

### 2.2.3 Fuel Oil Storage Tanks

Subpart K and Ka-Standards of Performance for Storage Vessels for Petroleum Liquids are not applicable since the number 2 fuel oil and diesel oil that PPI will use are not included in the definition of Petroleum Liquids under these parts.

### 3.0 NET EMISSIONS INCREASE ANALYSIS

As part of the utility plant expansion project PPI is planning to decommission and remove the two existing Superior boilers at its Barceloneta facility and install:

- five diesel engine electric generators rated at 1,500 KW each;
- a supplemental fired heat recovery steam generator (HRSG) which extracts heat from the diesel engine's exhaust which produces up to 30,000 lbs/hr of steam; and
- a package boiler which produces up to 30,000 lbs/hr of steam.

The potential annual emissions from the new equipment and the actual emissions from the existing Superior boilers are presented in this section. Actual emissions were subtracted from potential emissions to determine the net change for comparison with the PSD Significant Emission Rates. The results of this analysis are presented below.

#### 3.1 Determination of Future Potential Emissions

Table 3-1 provides a summary of the potential annual emissions from the new equipment to be installed for the utility plant expansion. All the new equipment will combust number 2 fuel oil or diesel fuel with a maximum sulfur content of 0.2 percent.

Each 1,500 KW diesel engine will combust a maximum of 745,500 gallons per year of fuel which corresponds to operation of the diesel engine at full load for 7,500 hours per year of operation each. Emission factors for the diesels are based on data provided by the vendor. Back-up information provided by the vendor supporting the use of these emission factors is included as an attachment to this document. The emission factors provided for NO<sub>x</sub> reflect the use of a dual SCR control technology with a removal efficiency of 97 percent.

The maximum heat inputs to the HRSG and package boiler are 37.5 MMBtu/hr each. The combined fuel usage of the HRSG, package boiler, and engines will be limited to 6.4 million gallons per year. At maximum engine utilization (7,500 hrs/yr) at full load, the annual average steam capacity of the new boiler and the HRSG boiler would be 45,500 lbs/hr which is based on 33,000 lbs/hr fuel fired and 12,500 lbs/hr from engine heat recovery. See Attachment 1.0 for the fuel use of the two boilers which is the basis for the annual average of 33,000 lbs/hr of steam from fuel firing. Emission factors for these steam boilers are based on data provided by the

TABLE 3-1  
Determination of Potential Emissions from PPI's Utility Plant Expansion

Pollutant	Five Diesel Engines		HRSG		Package Boiler	
	Emission Factor (lbs/1,000 gal)	Emissions (tons/yr)	Emission Factor (lbs/1,000 gal)	Emissions (tons/yr)	Emission Factor (lbs/1,000 gal)	Emissions (tons/yr)
SO <sub>2</sub>	27.30	50.90	28.40	23.04	28.40	14.99
NO <sub>x</sub>	19.74	36.80	13.95	11.32	12.00	6.33
CO	9.97	18.60	5.00	4.06	5.00	2.64
HC	2.99	5.55	0.20	0.16	0.20	0.11
PM	4.98	9.30	2.00	1.62	2.00	1.06
PM-10	3.98	7.45	1.00	0.81	1.00	0.53
Lead	.0012	.0022	.0012	.00097	.0012	.00063
<p><b>Assumptions/Notes</b></p> <ul style="list-style-type: none"> <li>Some emission factors after control</li> <li>Each engine will combust a maximum of 745,500 gal/yr of fuel corresponding to 7,500 hours/yr of operation each</li> <li>Each engine rated at 1,500 KW</li> <li>The maximum heat inputs to the HRSG and package boiler are 37.6 MMBtu/hr each.</li> <li>The combined fuel usage of the HRSG, package boiler and the engines will be limited to 6.4 million gallons/yr.</li> <li>HRSG boiler assumed to operate 8,760 hours/year</li> <li>Package boiler will operate to supplement steam need as required.</li> </ul>						

vendors which are also included as an attachment to this document. The emission factors provided for  $\text{NO}_x$  reflect the use of low- $\text{NO}_x$  burner technology for both boilers.

The total potential annual emissions determined for the utility plant expansion equipment listed in Table 3-2 are conservative and will never be exceeded. Compliance with these annual emissions will be enforced by limiting the total facility fuel usage to 6.4 million gallons of number 2 oil or diesel fuel per year and by limiting the operation of each diesel engine to 7,500 hour per year.

In its emission calculations, PPI has assumed that all five diesel engines will operate up to 7,500 hours per year. When operating simultaneously, these five have the capability to supply heat input to the HRSG to generate 12,500 lb/hr of steam. On average, PPI expects that three of the engines will be operating. This means that the HRSG will have to be supplementary fired to produce steam that otherwise would have been made by extracting heat from the exhaust of the remaining two engines. The emission factors for the diesel engines for pollutants of concern are greater than those listed for the HRSG. This means that during supplementary firing, emissions from the HRSG will be less than those generated by the remaining two diesels.

PPI intends to use the package boiler to produce steam as a supplement to the HRSG. The pollutant emission factors from these equipment are identical with the exception of  $\text{NO}_x$ . The  $\text{NO}_x$  emission factor for the package boiler is less than that for the HRSG.

The potential annual emissions are based on an operating philosophy of using the five diesel engines (limited to 7,500 hr/year each) to make steam and electricity with supplementary steam provided firstly by the HRSG and lastly by the package boiler. Therefore for the reasons stated above, when the diesels are operated less, and the total facility fuel consumption is limited to 6.4 million gallons per year, total annual emissions will be less than those presented in Table 3-2.

Table 3-2 presents a comparison of the potential annual emissions from utility plant expansion with the PSD Significant Emission Rates. Without considering contemporaneous decreases in emissions at the facility, the modification is subject to PSD review for  $\text{NO}_x$  and  $\text{SO}_2$  emissions. Actual emission decreases resulting from the decommissioning and removal of the two existing Superior boilers are quantified below.

### 3.2 Determination of Actual Emissions

The PSD regulations generally define actual emissions as the average rate, in tons per year, at which the unit actually emitted a pollutant during a two year period which precedes the date of PSD application submittal and is representative of normal operations. In this case, PPI has

TABLE 3-2

Comparison of the Potential Emissions from PPI's Utility Plant Expansion to the PSD Significant Emission Rates

Pollutant	Total Emissions <sup>1</sup> (tons/yr)	Significant Emission Rates (tons/yr)
SO <sub>2</sub>	88.90	40
NO <sub>x</sub>	54.44	40
CO	25.28	100
HC	5.84	40
PM	11.96	25
PM-10	8.76	15
Lead	0.00385	0.6
<sup>1</sup> Total annual emissions from the five 1,500 KW diesel engines, HRSG and package boiler		

averaged the actual emissions from January 1, 1992 to January 1, 1994 for use in the netting analysis. The actual emissions for each boiler were calculated based on annual fuel usage for each baseline year and the average sulfur content of the residual fuel oil over the baseline period. This back-up information is provided as an attachment to this document. Table 3-3 presents the results of the determination of actual emissions.

### **3.3 Determination of the Net Emission Change/PSD Applicability**

Actual emissions were subtracted from the future potential emissions to determine the net change for comparison with the PSD Significant Emission Rates. The results of this analysis are presented in Table 3-4. As shown, emissions of SO<sub>2</sub> decrease compared to baseline levels and the increase in emissions of the other PSD regulated pollutants will be less than the Significant Levels. PPI has thus concluded and request EPA's concurrence that the utility plant expansion will not be subject to PSD review.

TABLE 3-3

Determination of Actual Emissions from PPI's  
Two Existing Superior Package Boilers

Pollutant	Total Boilers No. 1 and 2	
	Emission Factor (lbs./1,000 gals.)	Emissions (tons/yr)
SO <sub>2</sub>	245.8	114.5
NO <sub>x</sub>	55.00	25.62
CO	5.00	2.33
HC	0.28	0.13
PM	17.61	8.20
PM-10	15.14	7.05
Lead	0.0169	0.00787
<b>Assumption:</b> - Average annual fuel usage for boiler nos. 1 and 2, from January 1, 1992 to January 1, 1994 is 931,646 gal. - Number 6 fuel oil fired in both boilers during the baseline period. - The average sulfur content of the fuel oil over the baseline period was 1.57 percent.		

**TABLE 3-4**  
**Determination of Net Emission Changes from the PPI Utility Plant Expansion Project**

Pollutant	Actual Emissions <sup>(1)</sup> (tpy)	Future Potential Emissions <sup>(2)</sup> (tpy)	Net Change in Emissions (tpy)	Significant Emission Rates (tpy)
SO <sub>2</sub>	114.5	88.90	-25.58	40
NO <sub>x</sub>	25.62	54.44	28.82	40
CO	2.33	25.28	22.95	100
HC	0.13	5.84	5.71	40
PM	8.20	11.96	3.76	25
PM-10	7.05	8.76	1.71	15
Pb	0.00787	0.00385	-0.00402	0.6
<sup>(1)</sup> from Table 3-3 <sup>(2)</sup> from Table 3-2				

**ATTACHMENTS**

# Attachment 1.0-PPI Utility Plant Expansion- Air Emissions Summary Table

One permit filed for both new boiler, engines and HR boiler  
 Peak steam 60,000 lb/hr (33,000 from fuel combustion, 12,600 from engine heat recovery)  
 Average steam 45,600 lb/hr  
 Permit-Proposed Conditions  
 -existing boilers removed after project completed  
 -can run either new boiler and HRS simultaneously to meet peak

Unit	Status	Steam lbs/hr	Output	Units	Fuel % S	Fuel Use (gal/hr)	Hrs/ Year	Fuel Use (gal/yr)	Nox control (note-1)	Emission Factors (lbs/1000 gals) (after control if present)						Emissions (Tons/yr)							
										NOx	SO2	CO	HC	PM	PM10	Pb	NOx	SO2	CO	HC	PM	PM10	Pb
New Engine 1 Engine 2 Engine 3 Engine 4 Engine 5 HR Boiler New Boiler	N	(2500)	1500	KW	0.2	99	7500	745500	97	19.74	27.30	9.97	2.99	4.98	3.98	0.0012	7.36	10.18	3.72	1.11	1.86	1.49	0.00045
	N	(2500)	1500	KW	0.2	99	7500	745500	97	19.74	27.30	9.97	2.99	4.98	3.98	0.0012	7.36	10.18	3.72	1.11	1.86	1.49	0.00045
	N	(2500)	1500	KW	0.2	99	7500	745500	97	19.74	27.30	9.97	2.99	4.98	3.98	0.0012	7.36	10.18	3.72	1.11	1.86	1.49	0.00045
	N	(2500)	1500	KW	0.2	99	7500	745500	97	19.74	27.30	9.97	2.99	4.98	3.98	0.0012	7.36	10.18	3.72	1.11	1.86	1.49	0.00045
	N	(2500)	1500	KW	0.2	99	7500	745500	97	19.74	27.30	9.97	2.99	4.98	3.98	0.0012	7.36	10.18	3.72	1.11	1.86	1.49	0.00045
	N	20000	2.50E+07	btu/hr	0.2	185	8760	1022222	Inox	13.95	28.40	5.00	0.20	2.00	1.00	0.0012	11.32	23.04	4.06	0.16	1.62	0.81	0.00097
Totals-->									Inox	12.00	28.40	5.00	0.20	2.00	1.00	0.0012	6.33	14.99	2.84	0.11	1.06	0.53	0.00063
										Potential Emissions-->													
										54.44 88.90 25.28 5.84 11.96 8.76 0.00385													
Existing Boiler 1 Boiler 2	E	6424	7.03E+10	btu/yr	1.57			(note-8) 465823	none	55.00	245.8	5.00	0.28	17.61	15.14	0.0169	12.81	57.24	1.16	0.07	4.10	3.53	0.00394
	E	6424	7.03E+10	btu/yr	1.57			465823	none	55.00	245.8	5.00	0.28	17.61	15.14	0.0169	12.81	57.24	1.16	0.07	4.10	3.53	0.00394
Actual Avg (Jan 92-Dec 93)-->										Actual Emissions-->													
										25.62 114.5 2.33 0.13 8.20 7.06 0.00787													
										28.82 25.58 22.96 5.71 3.76 1.71 0.00402													
										40.0 40.0 100.0 40.0 25.0 15.0 0.6													
										PSD Significance Levels-->													
										PSD Evaluation													
										Potential Emissions-->													
										Actual Emissions-->													
										Difference (Potential-Actual)-->													
										PSD Significance Levels-->													

## Notes

- 1-See attachment 1.1 -cross reference table for NOx emission factors and controls
- 2-See attachment 1.1 -cross reference table for NOx emission factors for new units, existing units based on AP 42 (7/93)-Table 1.3-2 Indust. boilers
- 3-SO2 emission factors are AP42 emission factors (7/93), Table 1.3-2 for boilers, Table 3.4-1 for engines-based on % S in fuel
- 4-See attachment 1.2 -cross reference table for CO emission factors and control (AP 42 factors are 7/93)
- 5-See attachment 1.3 -cross reference table for HC emission factors and control (AP 42 are 7/93)
- 6-See attachment 1.4 -cross reference table for PM emission factors and control (AP 42 are 7/93)
- 7-PM10 emission factors are AP42 (7/93), Table 1.3-7 for Boilers burning distillate, Table 1.3-8 for boilers burning residual, Table 3.4-5 PM10/TSP ratio for engines
- 8-see attachment 1.5- Lead emission factors
- 9-see attachment 2.0-PPI monthly fuel use and % S for 1992 and 1993

file: mgm600r2  
 3/30/94

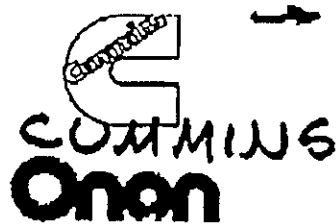
# PPI UTILITY PLANT EXPANSION – EMISSIONS

NOx

LEAVING STREAM	FUEL INPUT (EACH)	No. OF UNITS	(PER MANUF)		CALCULATED		STREAM TOTAL (TPY)	STACK TOTAL (TPY)	BASIS
			UNIT	QUANTITY	UNIT	QUANTITY			
DIESEL ENGINE (EACH)	99.4 GPH	5	GR/BHP	13.2	LB/MGAL	658.06	1228	NA	PER CUMMINS BLOCK TEST DATA SHEET EDS – 1288, DATED 7/93
FIRST STAGE SCR (EACH)	NA	5	LB/HR	6.54	LB/MGAL	65.81	123	NA	90% REDUCTION OF INCOMING NOx PER PEERLESS PROPOSAL DATED 3/18/94
SECOND STAGE SCR	NA	1	LB/HR	1.96	LB/MGAL	19.74	36.79	36.79	70% REDUCTION OF INCOMING NOx PER PEERLESS PROPOSAL DATED 3/18/94
AUXILIARY FIRING BURNER	185 GPH	1	LB/MMBTU	0.10	LB/MGAL	13.95	11.31	11.31	COEN PROPOSAL DATA INCLUDING 10 PPM AMMONIA SLIP FULLY CONVERTED TO NOx
PACKAGE BOILER	278 GPH	1	LB/MMBTU	0.09	LB/MGAL	12.00	6.33	6.33	COEN PROPOSAL DATA
TOTAL TO STACK								54.44	

## NOTES:

- 1 – DIESEL ENGINE ANNUAL FUEL =  $5 \times 99.4 \times 7500 = 3727000$  GPY
- 2 – AUXILIARY BURNER ANNUAL FUEL =  $185 \text{ GPH} \times 8760 = 1622222$  GPY
- 3 – PACKAGE BOILER ANNUAL FUEL =  $278 \text{ GPH} \times 3800 = 1055568$  GPY
- 4 – MANUFACTURERS' GUARANTEED PERFORMANCE EXCEEDS THAT SHOWN



→ Larry Shapiro  
PRINTER

# 1500 DFMB

## ONAN GENERATOR SET

### EXHAUST EMISSIONS DATA SHEET

copy from  
D. SCOTT GALLAGHER  
(513) 563-1122  
P.O. Box 42253  
Cincinnati, Ohio 45242

#### ENGINE

Model: Cummins KTTA50-G2

Type: 4 cycle, 60°V 10 Cylinder Diesel

Aspiration: Series Turbocharged and Aftercooled

Compression Ratio: 13.9:1

Emissions Control Device: Turbocharged and Aftercooled, with Variable Timing

Bore: 0.25 in. (159 mm)

Stroke: 0.25 in. (159 mm)

Displacement: 3067 cu. in. (50.3 liters)

#### PERFORMANCE DATA \*

BHP @ 1800 RPM (60 Hz)

Fuel Consumption (gal/Hr)

Air to Fuel Ratio

Exhaust Gas Flow (CFM)

Exhaust Gas Temperature (°F)

#### STANDBY

2220

99.4

25.8

10505

870

#### PRIME

1855

84.6

24.3

8330

850

\* The performance and emissions data shown here correspond to the maximum available engine power, and may not coincide with the operating data shown in the Generator Set Specification Sheet.

#### EXHAUST EMISSIONS DATA

(All values are grams/HP - Hour @ max BHP)

#### COMPONENT

HC (Total Unburned Hydrocarbons)

NO<sub>x</sub> (Oxides of Nitrogen as NO<sub>2</sub>)

CO (Carbon Monoxide)

PM (Particulate Matter)

SO<sub>2</sub> (Sulfur Dioxide)

CO<sub>2</sub> (Carbon Dioxide)

N<sub>2</sub> (Nitrogen)

O<sub>2</sub> (Oxygen)

H<sub>2</sub>O (Water Vapor)

#### STANDBY

0.24

→ 13.20

0.80

0.40

0.55

460

2800

680

170

#### PRIME

0.19

10.50

0.67

0.42

0.57

460

2700

340

170

#### TEST CONDITIONS

Data was recorded during steady-state rated engine speed ( $\pm 25$  RPM) with full load ( $\pm 2\%$ ). Pressures, temperatures and emission rates were stabilized.

Fuel Specification: ASTM D975 No. 2-D diesel fuel with 0.2% sulfur content (by weight) and 42-50 cetane number.

Fuel Temperature: 99°F  $\pm$  8° (at fuel pump inlet)

Intake Air Temperature: 77°F  $\pm$  8°

Barometric Pressure: 29.8 in. Hg  $\pm$  1 in.

Humidity: NO<sub>x</sub> measurement corrected to 75 grains H<sub>2</sub>O/lb dry air

The HC, NO<sub>x</sub> and CO emissions data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimates. This data is subject to instrumentation, measurement and engine-to-engine variability. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

7/93

Specifications May Change Without Notice.

EDS - 126

Onan Corporation 1400 73rd Avenue N.E. Minneapolis, MN 55432 (612) 574-6000



**PEERLESS MFG. CO.**

**SCR SYSTEMS DIVISION**

**FIRM PROPOSAL FOR**

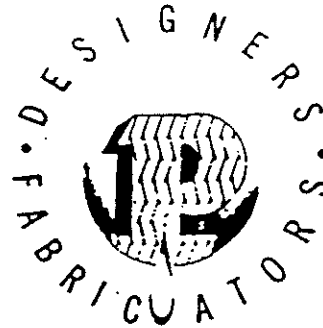
**PFIZER, INC.**

**PROJECT: COGENERATION PROJECT - CPA 0737**

**REFERENCE: BARCELONETA, PUERTO RICO**

**PMC-1143**

# PEERLESS MFG. CO.



POST OFFICE BOX 540  
DALLAS, TEXAS 75354  
TELEPHONE (214)357-  
TELEX 073-2345  
FAX (214)351-0194  
2819 WALNUT HILL L/  
DALLAS, TEXAS 75225

## QUOTATION

TO: Pfizer, Inc.  
235 East 42nd Street (205/3/2)  
New York, New York 10017

Proposal No: PMC-1143

Date: March 18, 1994

ATTENTION: MR. LARRY WISE  
CEMIS PURCHASING

Your Reference: CPA-0737-M10

### I. FIRM PROPOSAL FOR ONE (1) COGENERATION EMISSION CONTROL SYSTEM

ITEM	QUANTITY	DESCRIPTION	PRICE
		Firm Proposal for one (1) Cogeneration Emission Control System, to include the following:	
A	Lot	SCR Systems with Analyzers	
B	Lot	Dampers, Expansion Joints, Silencers ( <i>Information not available; Proposal to follow next week</i> )	Later
C	Lot	Diesel Generator Sets ( <i>Information not available; Proposal to follow next week</i> )	Later
D	Lot	Storage Tank and Pump Set	
E	Lot	Coen Burner/Combustion Chamber ( <i>Budgetary Price</i> )	
F	Option:	Deduct for SCR Control System, as described in Section IV.A.10, from Item A.	

All Purchase Orders based on this Quotation, which is not an offer, are subject to acceptance by Seller at its principal office in Dallas, Texas. Unless otherwise expressly provided in Seller's acceptance, the terms and conditions set forth herein shall constitute a part of any agreement resulting from Seller's acceptance of an order for all or part of the goods covered by this Quotation. This Quotation serves as notice to Buyer of Seller's objection to any terms and conditions of Buyer that in any way conflict with, modify, condition, add to, or differ from the terms and conditions specified herein, unless such terms and conditions of Buyer are expressly included in Seller's acceptance of Buyer's order. Silence on the part of Seller shall not be construed, under any circumstances, as acceptance of Buyer's terms and conditions.

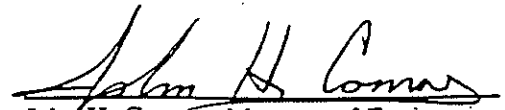
If not previously revoked or otherwise provided herein, this Quotation shall terminate and cease to exist thirty (30) days from the date of this Quotation.

SEE REVERSE SIDE HEREOF FOR WARRANTIES AND DISCLAIMERS THEREOF.

EX WORKS:

CC: DBE-R, PMC-1143/HPT (53)

TERMS: Net Thirty (30) Days

  
John H. Conroy, Manager of Engineering  
SCR Systems Division

SPECIALISTS IN SELECTIVE CATALYTIC REDUCTION SYSTEMS

FORM 930:

From Review 3/18

IV. PERFORMANCE GUARANTEE POINT FIRST STAGE

1 -	<u>AMMONIA/NO<sub>x</sub> MOLE RATIO</u>	< 1.0
2 -	<u>AMMONIA SLIP</u>	< 20 PPM
3 -	<u>CONVERSION (REDUCTION) EFFICIENCY</u>	95 %
4 -	<u>OUTLET NO<sub>x</sub> CONCENTRATION</u> BASED ON EXHAUST FLOW (PER ENGINE) @ 15.0% O <sub>2</sub>	≤ 3.2 LB/HR ≤ 61.5 PPM VOL
5 -	<u>GAS FLOW RATE</u>	
	MASS FLOW	18,721 LB/HR
	VOLUMETRIC FLOW	10,505 AFPM at 870°F
6 -	<u>SPACE VELOCITY</u>	4,800 1/HR
7 -	<u>AQUEOUS AMMONIA CONSUMPTION</u>	92 LB/HR
8 -	<u>FLUE GAS PRESSURE DROP</u>	4.0 IN. H <sub>2</sub> O
9 -	<u>FLUE GAS TEMPERATURE</u>	
	DESIGN	870 °F
	OPERATING RANGE	600°F - 1000°F
10 -	<u>DESIGN FLUE GAS COMPOSITION (MOLE %)</u>	
	NITROGEN (N <sub>2</sub> )	75.98
	CARBON DIOXIDE ( <del>N<sub>2</sub></del> ) (CO <sub>2</sub> )	7.71
	WATER (H <sub>2</sub> O)	7.13
	OXYGEN (O <sub>2</sub> )	8.98
	ARGON ( <del>H<sub>2</sub>O</del> ) (Ar)	0.00
	SO <sub>2</sub>	
	TOTAL	

### III. UNIT DATA SECOND STAGE

1 -	<u>REACTOR</u>			900	FT
	A - VOLUME				
	B - INSIDE DIMENSIONS			8	FT
	HEIGHT			12	FT
	WIDTH			9	FT
	DEPTH				
	C - WEIGHT			14,000	LBS
	HOUSING			28,000	LBS
	TOTAL: HOUSING AND CATALYST				
	D - MATERIALS OF CONSTRUCTION (HOT WALL REACTOR)			304SS	
	CATALYST MODULES			Corten	
	MODULE SUPPORT FRAMEWORK			Corten	
	REACTOR HOUSING WALL/SUPPORTS			Not by PMC	
	INSULATION			See Attached	
	E - GEOMETRIC CONFIGURATION TYPE (ATTACH DIAGRAM)			4.0 IN. H.O	
	F - TOTAL PRESSURE DROP			20" W.C.	
	G - DESIGN PRESSURE RATING				
2 -	<u>CATALYST</u>			18	
	A - NUMBER OF CATALYST MODULES			4	FT
	B - CATALYST MODULE DIMENSIONS:			4	FT
	HEIGHT			1	FT
	WIDTH			11,750	LBS
	DEPTH			Honeycomb	
	C - WEIGHT (CATALYST AND MODULES)			Horizontal	
	D - MATERIAL OF CONSTRUCTION (CATALYST TYPE)			1,000	°F
	E - GEOMETRIC CONFIGURATION TYPE (ARRANGEMENT)			70	%
	F - MAXIMUM ALLOWABLE TEMPERATURE				
	G - PERCENT OPEN AREA				
3 -	<u>AMMONIA STORAGE TANK AND DISTRIBUTION SYSTEM(S)</u>				
	<del>A - STORAGE TANK</del>				
3	A - DISTRIBUTION SYSTEM BLOWER(S)			AFCU #3	
	TAG NUMBER(S)			2	
	QUANTITY			Rotron	
	MANUFACTURER			Regenerative	
	TYPE			DR 505	
	MODEL NUMBER				
	MATERIAL OF CONSTRUCTION			Cast Steel	
	EXTERNAL			Aluminum	
	INTERNAL			100	CFM
	CAPACITY			3,600	RPM
	RPM			200	LBS
	WEIGHT			1.5	PSI
	DESIGN DIFFERENTIAL PRESSURE				
	EFFICIENCY AT RATED LOAD				
4 -	<u>ELECTRICAL</u>				
	VOLTAGE/PHASE/FREQUENCY	480	VAC/	3	PH/60 H
	TOTAL CONNECTED LOAD			35	kW
	INSTRUMENTATION				KV
5 -	<u>PHYSICAL</u>				
	OVERALL LENGTH			14'	
	OVERALL WIDTH			6'	
	OVERALL HEIGHT			7'	
	OPERATING WEIGHT			6,200	LBS
	SHIPPING WEIGHT			10,200	LBS
	RIGGING WEIGHT			7,200	LBS

6 - SPECIAL REQUIREMENTS/OPTIONS

GROUNDING PADS	YES
VARIABLE SPEED CONTROL	YES
BEAR VIBRATION MONITORING	SIDE
ACCESS LOCATION	N/A PP
CONCENTRATION MONITOR ACCURACY	± 0.01%
DIGITAL DISPLAY ACCURACY	

7 - EXCEPTIONS (IF NONE, STATE NONE)

3. The ammonia storage tank is described in the primary SCR Section 3.

IV. PERFORMANCE GUARANTEE POINT SECOND STAGE

1 -	<u>AMMONIA/NO<sub>x</sub> MOLE RATIO</u>	< 1
2 -	<u>AMMONIA SLIP</u>	< 5 PP
3 -	<u>CONVERSION (REDUCTION) EFFICIENCY</u>	80
4 -	<u>OUTLET NO<sub>x</sub> CONCENTRATION</u>	≤ 3.9 LB/V
	BASED ON EXHAUST FLOW	≤ 12.3 PPM V
	3 15.0% O <sub>2</sub>	
5 -	<u>GAS FLOW RATE</u>	118,344 LB/V
	MASS FLOW	71,042 AF
	VOLUMETRIC FLOW	@ 870°F
		5,118 1/2
6 -	<u>SPACE VELOCITY</u>	23 LB/V
7 -	<u>AQUEOUS AMMONIA CONSUMPTION</u>	4.0 IN. H <sub>2</sub> O
8 -	<u>FLUE GAS PRESSURE DROP</u>	
9 -	<u>FLUE GAS TEMPERATURE</u>	870
	DESIGN	600°F - 1000
	OPERATING RANGE	
10 -	<u>DESIGN FLUE GAS COMPOSITION (MOLE %)</u>	73.31
	NITROGEN (N <sub>2</sub> )	7.46
	CARBON DIOXIDE (CO <sub>2</sub> )	7.69
	WATER (H <sub>2</sub> O)	9.45
	OXYGEN (O <sub>2</sub> )	0.00
	ARGON (Ar)	
	SO <sub>2</sub>	
	TOTAL	

## PEERLESS MFG. CO. EXPERIENCE LIST

### MIDSUN

Bakersfield, California  
One LM-2500, 21 Megawatts  
1988 Start-Up

### PROCTOR & GAMBLE

Oxnard, California  
One LM-5000, 33 Megawatts  
1988 Start-Up

### SITHE ENERGIES/USN (NORIS)

San Diego, California  
One LM-5000, 33 Megawatts  
1988 Start-Up

### SITHE ENERGIES/USN (NAVSTA)

San Diego, California  
One Frame 6, 37 Megawatts  
1988 Start-Up

### SITHE ENERGIES/USN (NTC-MCRD)

San Diego, California  
One LM-2500, 21 Megawatts  
1988 Start-Up

### CARSON ENERGY

Ice Haus II  
Carson, California  
One LM-5000, 33 Megawatts  
1989 Start-Up

### OCEAN STATE POWER Phase I

Burrillville, Rhode Island  
Two Frame 7's, 250 Megawatts  
1990 Start-Up

### O'BRIEN, CALIFORNIA Cogen II

Salinas, California  
One LM-5000, 33 Megawatts  
1990 Start-Up

### O'BRIEN NEWARK BOXBOARD

Cogen Plant  
Newark, New Jersey  
One Frame 6, 37 Megawatts  
1990 Start-Up

### O'BRIEN DUPONT PARLIN

Cogen Plant  
Parlin, New Jersey  
Two Frame 6's, 74 Megawatts  
1990 Start-Up

### EOR COGENERATION

Oildale, California  
One LM-2500, 21 Megawatts  
1991 Start-Up

### OCEAN STATE POWER

Phase II  
Burrillville, Rhode Island  
Two Frame 7's, 250 Megawatts  
1991 Start-Up

### RICHMOND POWER ENTERPRISE

Richmond, Virginia  
Two ABB-11N's, 170 Megawatts  
1991 Start-Up

### TEXACO REFINING

Wilmington, California  
Seven Fired Heaters  
1991-92 Start-Up

### DOSWELL, LTD. PARTNERSHIP

Doswell, Virginia  
Four KWU V84.2's, 650 Megawatts  
1991 Start-Up

### ARCO REFINING

Wilmington, California  
One Hydrogen Reformer  
1991 Start-Up

### HANFORD COGENERATION

Hanford, California  
One Pkg'd Boiler, 66,000 Lbs/Hr  
1991 Start-Up

### CAMDEN COGENERATION

Camden, New Jersey  
One Frame 7, 160 Megawatts  
February 1993 Start-Up

### LOCKHEED ADVANCED DEVELOPMENT COMPANY

Palmdale, California  
One Pkg'd Boiler, 75,000 Lbs/hr  
August 1993 Start-Up

### JFK/KIAC

New York, New York  
Two LM-6000's, 100 Megawatts  
1993 Start-Up

### ASHLAND PETROLEUM

St. Paul, Minnesota  
One Fired Heater, 100MM BTU/hr  
1993 Start-Up

### CHEVRON U.S.A. REFINERY

El Segundo, California  
One Process Heater  
1993 Start-Up

### MONT BELVIEU

Mont Belvieu, Texas  
One Waste Heat Boiler  
1993 Start-Up

### HAWAIIAN ELECTRIC

Kahului, Maui, Hawaii  
SCR Pilot Plant  
1993 Start-Up

### MOBIL OIL CORPORATION

Torrance, California  
Two (2) Packaged Boilers  
1994 Start-Up

### UNOCAL

Wilmington, California  
One Hydrogen Reformer  
1995 Start-Up

### SO CAL GAS/ALISO CANYON

Northridge, California  
One LM-6000  
1996 Start-Up


### SMUD/CARSON ICE-GEN

Elk Grove, California  
Two LM-6000's  
1995 Start-Up

### MCGAW COGENERATION

Irvine, California  
One Solar Centaur  
1995 Start-Up

A Hachin  
1.1

 <b>COEN</b> COMPANY, INC.		1510 TANFORD AVE. WOODLAND, CA 95776 U.S.A.		PHONE: (916) 888-2100 FAX: SEE <input checked="" type="checkbox"/> BELOW		SHEET <u>1</u> OF <u>5</u>	
TO: <u>H. P. Thompson UTEL</u>		(FAX) <u>CT Larry Shapiro</u>		MEMO <input type="checkbox"/> FAX <input type="checkbox"/>		NOTE <input type="checkbox"/>	
ATTN: <u>D. Scott Gallahan</u>		PHONE: _____		DATE: <u>3/16/94</u>		<u>Dsg 2:30 PM</u> <u>16 Mar 94</u>	
SUBJECT: <u>PFIBER, P.R.</u>							

BASE LINE NOx ON No.2 OIL IN TYPICAL RANGE OF 129 PPM NOx. USING CONVERSION FORMULA FOR No.2 OIL OF:

$$\frac{\text{PPM NOx}}{898} [1 + \frac{5.5}{93.8}] = \frac{\text{LB NOx}}{10^6 \text{ Btu}}$$

WITH CORRECTIONS TO 3% O<sub>2</sub> = APPROX 15% E.A. WE HAVE:

$$\frac{129}{898} [1 + \frac{15}{93.8}] = 0.167 \frac{\text{LB}}{10^6 \text{ Btu}}$$

THIS IS BASED ON FCN OF 0.02% N<sub>2</sub> - USING CHART(S) THE FUEL NOx IS 0.028 #/10<sup>6</sup> Btu, AND THERMAL, THEN 0.167 MINUS 0.028 = 0.139 #/10<sup>6</sup> Btu. IF WE CAN REDUCE THE THERMAL PORTION OF 0.139 BY 50% USING APPROX 10% FGR, THEN THERMAL NOx CONTRIBUTION IS 0.0695 ~ IF THE FCN ON OUR FUEL IS 64 PPM OR 0.0064% THEN THE FUEL NOx FROM CURVE IS ABOUT 0.01 #/10<sup>6</sup> Btu. ADDING THAT TO THE THERMAL WE HAVE AN CORRECTED NOx OF 0.08 LB/10<sup>6</sup> Btu OR 62 PPM NO<sub>2</sub> AT 3% O<sub>2</sub>.

THE LOW NITROGEN AMBER 363 FUEL IN SOUTHERN CAL RANGES 10-20 PPM Nitrogen. Road Diesel runs around 120 to 150 and as high as 300 PPM in some parts of country.

Typical speed we are seeing is 70 or 80 PPM are about 0.1 LB NOx/10<sup>6</sup> Btu.

Ogra this helps - Roy

FROM: <u>Roy Mann</u>		CC: _____	
FAX NUMBERS <input type="checkbox"/> (916) 888-2170		Steam Generation/Fuel Handling: <input type="checkbox"/> (916) 888-2171	
Executive/Materials/Buyers: <input type="checkbox"/> (916) 888-2170		MicroNOx: <input type="checkbox"/> (916) 888-2179	
		FAX <input type="checkbox"/> (916) _____	

03/08/94

12:43

T846 2986

PFIZER ENG.

005

-Att. 1.4

94 03/08 11:22

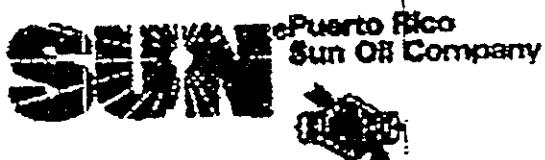
Z 8897942879

R P C I.

83

02/22/1994 16:42 FROM P.R. SUN OIL Co MARKETING TO AMER. PETUM.

P.02

JOHN M. S.  
President and  
Refinery Manager

## ANALYTICAL REPORT

DIESEL FUEL  
HIGH SULFUR DYED

## SAMPLE IDENTIFICATION:

SOURCE: TK 86DATE: 02/20/94TIME: 04:25 HRS.

	METHOD	SPECIFICATIONS		DATA
		MIN	MAX	
API GRAVITY	D-287		42	38.0
DISTILLATION:	D-86			
10%	REPORT			485
50%	REPORT			551
90%			650	600
EP	REPORT			630
SULFUR, WT. %	D-4284		0.5	0.2
FLASH, FMCC, °F	D-93		150	184
VISCOSITY, CST/100 °F	D-445		REPORT	3.87
CETANE INDEX	D-976		45	53
HEATING VALUE (NET), BTU/LB.	**		REPORT	18380
TOTAL NITROGEN, PPM	D-4829		REPORT	64

\*\* CALCULATED BUREAU OF MINES



# PPI UTILITY PLANT EXPANSION – EMISSIONS

CO

LEAVING STREAM	FUEL INPUT (EACH)	No. OF UNITS	(PER MANUF)		CALCULATED		STREAM TOTAL (TPY)	STACK TOTAL (TPY)	BASIS
			UNIT	QUANTITY	UNIT	QUANTITY			
DIESEL ENGINE (EACH)	99.4 GPH	5	GR/BHP	0.8	LB/MGAL	39.88	74	NA	PER CUMMINS BLOCK TEST DATA SHEET EDS-1268, DATED 7/93
FIRST STAGE SCR (EACH)	NA	5	LB/HR	NA	LB/MGAL	0.00	NA	NA	
SECOND STAGE SCR	NA	1	LB/HR	NA	LB/MGAL	0.00	NA	NA	
EXTERNAL COMB. CHAMBER	NA	1	GR/BHP	0.2	LB/MGAL	9.97	18.58	18.58	NET 75% REDUCTION PER COEN PROPOSAL
AUXILIARY FIRING BURNER	185 GPH	1	LB/MGAL	5.00	LB/MGAL	5.00	4.06	4.06	PER EPA EMISSION FACTOR – AP42, 7/93 TABLE 1.3-2
PACKAGE BOILER	278 GPH	1	LB/MGAL	5.00	LB/MGAL	5.00	2.64	2.64	PER EPA EMISSION FACTOR – AP42, 7/93 TABLE 1.3-2
TOTAL TO STACK								25.28	

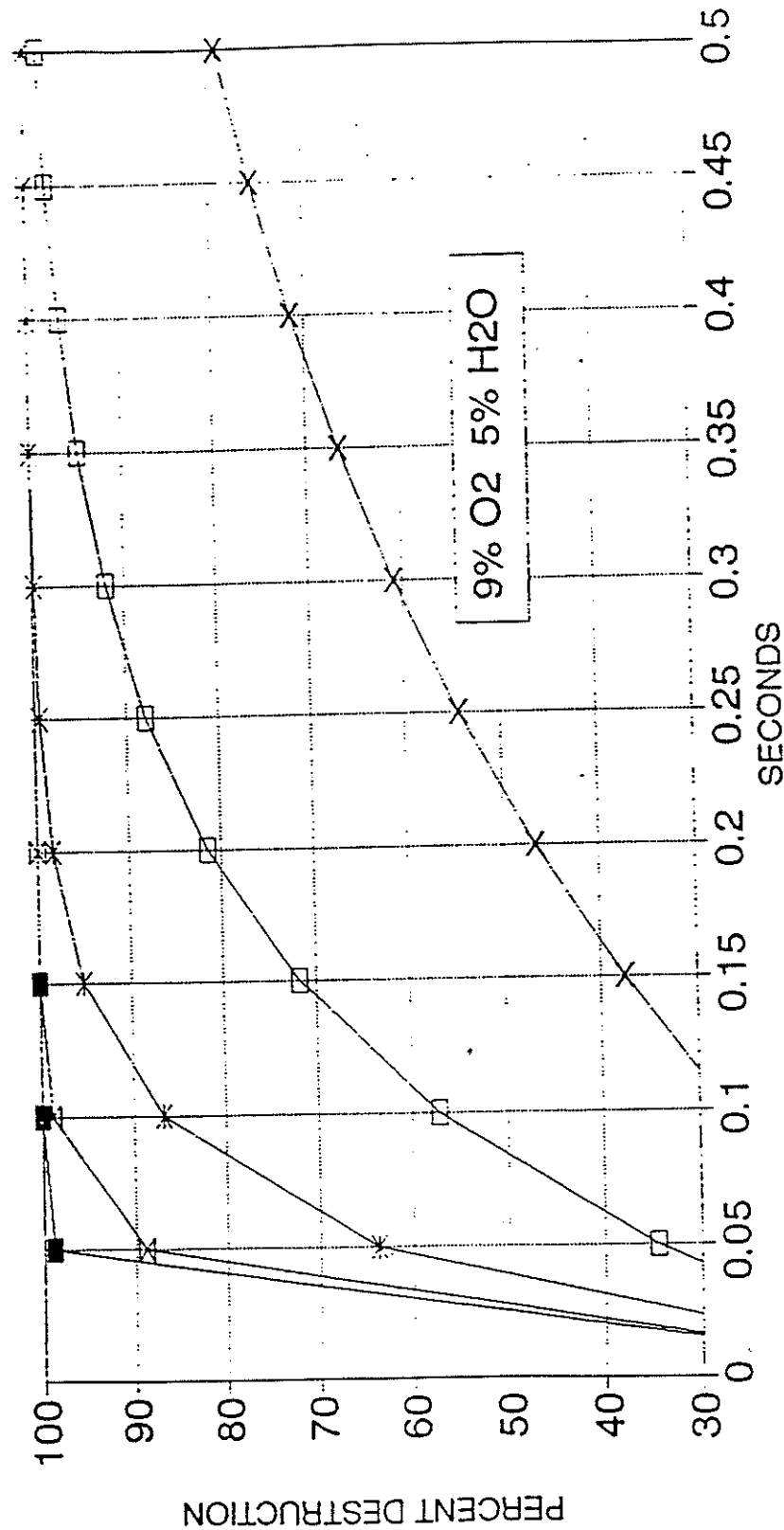
## NOTES:

- 1 – DIESEL ENGINE ANNUAL FUEL =  $5 \times 99.4 \times 7500 = 3727000$  GPY
- 2 – AUXILIARY BURNER ANNUAL FUEL =  $185 \text{ GPH} \times 8760 = 1622222$  GPY
- 3 – PACKAGE BOILER ANNUAL FUEL =  $278 \text{ GPH} \times 3800 = 1055556$  GPY
- 4 – MANUFACTURERS' GUARANTEED PERFORMANCE EXCEEDS THAT SHOWN

PEERLESS MFG. CO.  
ADDENDUM #3 TO PMC-1143  
INCINERATION CURVES

April 4, 1994

CO DESTRUCTION VS  
TIME AND TEMPERATURE



PT<sub>1200</sub> temp = 2200 F  
Resid time > 25 sec

■ - 1500 DEG F  
□ - 1400 DEG F  
\* - 1300 DEG F  
x - 1200 DEG F  
x - 1100 DEG F

## PPI UTILITY PLANT EXPANSION – EMISSIONS

HC

LEAVING STREAM	FUEL INPUT (EACH)	No. OF UNITS	(PER MANUF)		CALCULATED		STREAM TOTAL (TPY)	STACK TOTAL (TPY)	BASIS
			UNIT	QUANTITY	UNIT	QUANTITY			
DIESEL ENGINE (EACH)	99.4 GPH	5	GR/BHP	0.24	LB/MGAL	11.96	22	NA	PER CUMMINS BLOCK TEST DATA SHEET EDS - 128B, DATED 7/93
FIRST STAGE SCR (EACH)	NA	5	LB/HR	NA	LB/MGAL	0.00	NA	NA	
SECOND STAGE SCR	NA	1	LB/HR	NA	LB/MGAL	0.00	NA	NA	
EXTERNAL COMB. CHAMBER	NA	1	GR/BHP	0.06	LB/MGAL	2.99	5.57	5.57	NET 75% REDUCTION PER COEN PROPOSAL
AUXILIARY FIRING BURNER	185 GPH	1	LB/MGAL	0.20	LB/MGAL	0.20	0.16	0.16	PER EPA EMISSION FACTOR AP42, 7/93 TABLE 1.3-4
PACKAGE BOILER	278 GPH	1	LB/MGAL	0.20	LB/MGAL	0.20	0.11	0.11	PER EPA EMISSION FACTOR AP42, 7/93 TABLE 1.3-4
TOTAL TO STACK								5.84	

## NOTES:

- 1 - DIESEL ENGINE ANNUAL FUEL =  $5 \times 99.4 \times 7500 = 3727000$  GPY
- 2 - AUXILIARY BURNER ANNUAL FUEL =  $185 \text{ GPH} \times 8760 = 1627222$  GPY
- 3 - PACKAGE BOILER ANNUAL FUEL =  $278 \text{ GPH} \times 3800 = 1055558$  GPY
- 4 - MANUFACTURERS' GUARANTEED PERFORMANCE EXCEEDS THAT SHOWN

This copy for  
Larry Shapiro  
Pfizer, NYC

D. Scott Gallagher  
Consultant

722 Eagle View Court  
Mason, Ohio 45040

DE  
LS  
JZ

PAX  
(513) 563-6287

Phones  
(513)398-4230  
(513)563-1122

To: Jon Backlund  
Caen, Burlingame

Date: 18 Mar. 94

Subject: PFIZER PHARMACEUTICALS, Inc BARCELONETA  
COGENERATION PROJECT ISN 1268/CPA 0737 PUERTO RICO

Attached is sheet giving further answers  
to your questions.

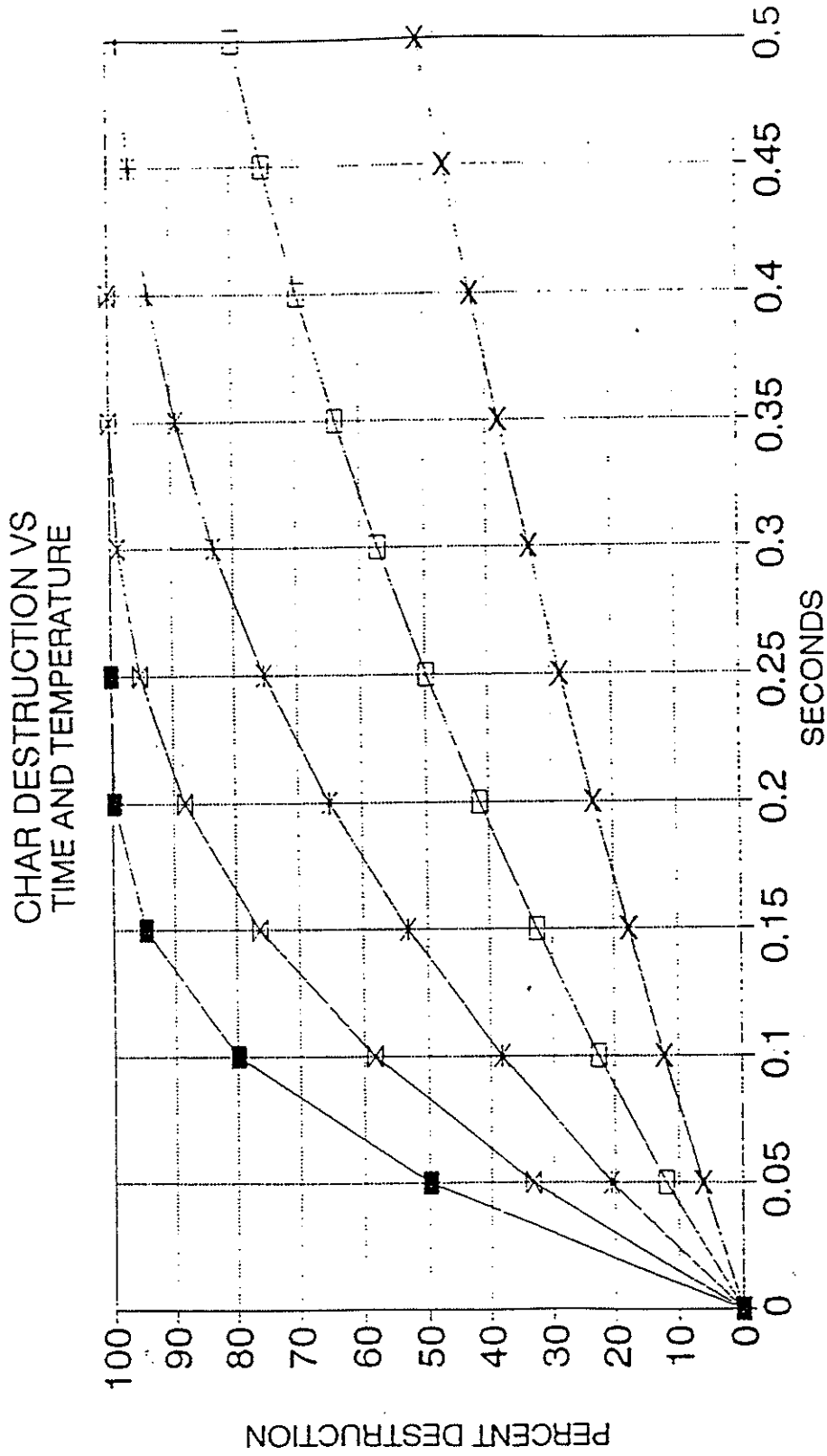
Also, Cummins restates the particle  
size distribution of unburned  
carbon from their Model 1250DFMB  
diesel gen-set:

under 1 micron	92%
1 to 2 1/2 microns	1.5%
2 1/2 to 10 "	2.5%
over 10 "	4%
	<u>100%</u>

Your study is urgently needed.

Regards,  
D. Scott Gallagher

PEERLESS MFG. CO.  
ADDENDUM #3 TO PMC-1143  
INCINERATION CURVES



9% O2 5% H2O 1 MICRON

PTizer temp ~ 2200 F  
Resid time > 125 sec

## PPI UTILITY PLANT EXPANSION – EMISSIONS

PM

LEAVING STREAM	FUEL INPUT (EACH)	No. OF UNITS	(PER MANUF)		CALCULATED		STREAM TOTAL (TPY)	STACK TOTAL (TPY)	BASIS
			UNIT	QUANTITY	UNIT	QUANTITY			
DIESEL ENGINE (EACH)	99.4 GPH	5	GR/BHP	0.4	LB/MGAL	19.94	37	NA	PER CUMMINS BLOCK TEST DATA SHEET EDS – 128B, DATED 7/93
FIRST STAGE SCR (EACH)	NA	6	LB/HR	NA	LB/MGAL	0.00	NA	NA	
SECOND STAGE SCR	NA	1	LB/HR	NA	LB/MGAL	0.00	NA	NA	
EXTERNAL COMB. CHAMBER	NA	1	GR/BHP	0.10	LB/MGAL	4.99	9.29	9.29	NET 75% REDUCTION PER COEN PROPOSAL
AUXILIARY FIRING BURNER	185 GPH	1	LB/MGAL	2.00	LB/MGAL	2.00	1.62	1.62	PER EPA EMISSION FACTOR AP42, DATED 7/93 TABLE 1.3-2
PACKAGE BOILER	278 GPH	1	LB/MGAL	2.00	LB/MGAL	2.00	1.08	1.08	PER EPA EMISSION FACTOR AP42, DATED 7/93 TABLE 1.3-2
TOTAL TO STACK								11.97	

## NOTES:

- 1 – DIESEL ENGINE ANNUAL FUEL =  $5 \times 99.4 \times 7500 = 3727000$  GPY
- 2 – AUXILIARY BURNER ANNUAL FUEL =  $185 \text{ GPH} \times 8760 = 1622222$  GPY
- 3 – PACKAGE BOILER ANNUAL FUEL =  $278 \text{ GPH} \times 3800 = 1055556$  GPY
- 4 – MANUFACTURERS' GUARANTEED PERFORMANCE EXCEEDS THAT SHOWN

# Attachment 1.5 -PPI Utility Expansion -Lead Emission Factors

Boilers-#2 fuel oil-factors from ENSR -2/7/94	
(8.9 lbs/10 <sup>12</sup> BTU) x 135,000 btu/gal x 1000 gallons=	0.001202 lbs/1000gal
Engines-#2 fuel oil -from ENSR 2/7/94	
(8.9 lbs/10 <sup>12</sup> BTU) x 135,000 btu/gal x 1000 gallons=	0.001202 lbs/1000gal
Existing Boilers-# 6 fuel oil	
# 6 fuel oil- lead range (28-194 lbs/10 <sup>12</sup> BTU) used 111 lbs--from ENSR 2/7/94	
(111 lbs/10 <sup>12</sup> BTU) x 153000 btu/gal x 1000 gallons=	0.016983 lbs/1000gal

mgm600r2  
3/30/94

# Attachment 2.0 PPI Utility Expansion - 1992/1993 Fuel Consumption

Month	Year	Fuel Use (GALS)	Fuel % S	Emissions (TPY)		
				SO2 (see note 1)	PM (see note 2)	PM10 (see note 3)
January	1992	69217	1.49	8.10	0.59	0.50
February	1992	72767	1.59	9.08	0.65	0.56
March	1992	68140	1.63	8.72	0.62	0.53
April	1992	69579	1.58	8.63	0.62	0.53
May	1992	76053	1.63	9.73	0.69	0.60
June	1992	74045	1.63	9.47	0.67	0.58
July	1992	69269	1.63	8.86	0.63	0.54
August	1992	83967	1.70	11.21	0.79	0.68
September	1992	82110	1.63	10.47	0.75	0.64
October	1992	81491	1.57	10.04	0.72	0.62
November	1992	66576	1.57	8.21	0.59	0.51
December	1992	74317	1.40	8.17	0.60	0.51
1992 total		887531	1.59	110.69	7.91	6.80
January	1993	82800	1.45	9.42	0.68	0.59
February	1993	66958	1.16	6.10	0.46	0.40
March	1993	82881	1.27	8.26	0.62	0.53
April	1993	81564	1.48	9.48	0.69	0.59
May	1993	80826	1.68	10.66	0.75	0.65
June	1993	81922	1.60	10.29	0.73	0.63
July	1993	71590	1.70	9.55	0.67	0.58
August	1993	79850	1.65	10.34	0.73	0.63
September	1993	83999	1.61	10.62	0.76	0.65
October	1993	97984	1.61	12.38	0.88	0.76
November	1993	93949	1.64	12.09	0.86	0.74
December	1993	71437	1.62	9.08	0.65	0.56
1993 total		975760	1.54	118.29	8.49	7.31
1992/1993 avg		931646	1.565	114.49	8.20	7.05

## Notes

1-USEPA 7/93 Emission factors-table 1.3-2

2-USEPA 7/93 Emission factors-table 1.3-2

3-USEPA 7/93 Emission factors-table 1.3-6

4-Fuel use and % S from EQB Monthly reporting froms

mgm600r2

3/26/94

### **Section 3.3**

#### **Other Agency Permit Compliance Evidence**

**ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DEL GOBERNADOR  
JUNTA DE CALIDAD AMBIENTAL**



**ASESORAMIENTO CIENTIFICO**

DADA-2809-94

2 de diciembre de 1994

Sr. Pedro José Rivera  
Director  
Oficina de Asuntos Ambientales  
Compañía de Fomento Industrial  
Apartado 362350  
San Juan, Puerto Rico 00936

Asunto: EA 94-0039 (CFI)  
PFIZER PHARMACEUTICALS INC.  
EXPANSION DE UTILIDADES  
BARCELONETA, PUERTO RICO  
CASO 94-267

Estimado señor Rivera:

La Junta de Calidad Ambiental ha analizado el documento ambiental sometido para el proyecto de referencia.

Entendemos que al presentar el mismo su instrumentalidad ha cumplido con la fase de evaluar el posible impacto ambiental de la acción propuesta, de acuerdo con el Artículo 4 (c) de la Ley sobre Política Pública Ambiental, Ley Número 9 del 18 de junio de 1970, según enmendada. No obstante, para una mejor realización de la acción propuesta, esta Junta emite las siguientes recomendaciones:

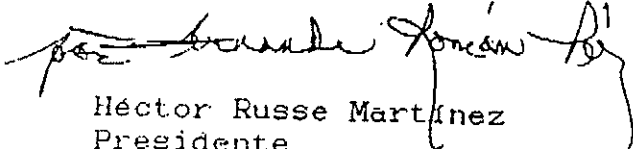
1. Durante las fases de construcción y operación del proyecto, se deberá cumplir con el Reglamento para el Control de la Contaminación por Ruido, en lo relacionado al nivel de sonido máximo permitido.
2. Previo a dar comienzo a la construcción o efectuar algún movimiento de tierra, deben obtener de esta Junta los siguientes permisos:
  - a- Permiso Fuente de Emisión (PFE) para polvo fugitivo durante la etapa de construcción.
  - b- Permiso para realizar una Actividad Generante de Desperdicios Sólidos No Peligrosos (Forma DS-3).
  - c- Someter un Plan para el Control de la Erosión y Sedimentación de los Terrenos (CEST).

Sr. Pedro José Rivera  
EA 94-0039 (CFI)  
Página 2  
2 de diciembre de 1994

3. Se deberán tomar las medidas necesarias para evitar que residuos de sustancias orgánicas e inorgánicas, tales como aceites, combustibles, u otras sustancias químicas puedan ser arrastradas por la escorrentía y ganen acceso a un cuerpo de agua.
4. Coordinar con la Autoridad de Acueductos y Alcantarillados (AAA) el aumento en la descarga del proyecto a su sistema de tratamiento de aguas usadas.
5. De tener alguna descarga de aguas de escorrentía a cualquier cuerpo de agua, deberán preparar y someter un Plan de Mejores Prácticas de Manejo, para prevenir que contaminantes ganen acceso al mismo. Además, se deberá consultar con la Agencia Federal de Protección Ambiental para determinar si dicha descarga requiere un permiso "NPDES".
6. Proveer el equipo de control necesario para el cumplimiento del Título V de las Enmiendas del 1990 a la Ley de Aire Limpio y radicar su solicitud (para el Título V) incluyendo esta fuente cuando entre en vigencia el Programa y en la fecha programada para esta industria.
7. Obtener Permiso del Area de Calidad de Agua de esta Junta para la instalación del tanque de amoniaco de 20,000 galones.
8. Deseamos señalar que las calderas nuevas a ser instaladas estarán afectadas por la Reglamentación Federal, Parte 60, Sub-Parte Dc del 40 CFR.

Agradecemos su cooperación por mantener y conservar la calidad de nuestro ambiente.

Cordialmente,

  
Héctor Russe Martínez  
Presidente



GOBIERNO DE PUERTO RICO/ OFICINA DEL GOBERNADOR  
JUNTA DE CALIDAD AMBIENTAL

AREA CALIDAD DE AIRE

TELEFONO OFICINA- (809)-767-8071//FAX-(809)-766-6906

SR. FRANCISCO CLAUDIO RIOS- DIRECTOR

SR. ESTEBAN DEL RIO - JEFE, PERMISOS E INGENIERIA //

SR. JULIO I. RODRIGUEZ - JEFE, PLANIFICACION DE AIRE

SR. MORGAN MORENO - JEFE, SUSTANCIAS TOXICAS //

SRA. LUZ A. LOPEZ - JEFE, PLAN CES Y AHERA

SRA. ROSA M. GONZALES - JEFE, MAESTRIGO DE AIRE //

SRA. EVELYN RODRIGUEZ - JEFE, VALIDACION Y MANEJO DE DATOS

23 de mayo de 1995

PFIZER PHARMACEUTICALS, INC.  
P/C ING MARIA DEL PILAR PUEBLA  
MERCANTIL PLAZA MEZZANINE SUITE  
HATO REY PR 00918

RE: CPC-95-09-0146  
EXPANSION DE  
UTILIDADES  
CARR 2 KM 58.2  
BARCELONETA, PR

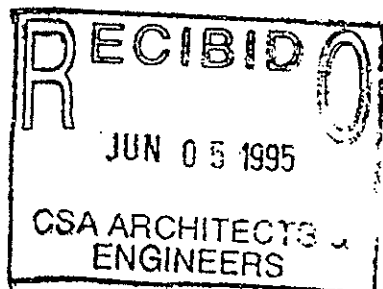
Estimado (a) ingeniero Puebla:

Con relación al Plan de Control de Erosión y Sedimentación de los Terrenos (Plan-C.E.S.T) para el proyecto de referencia, sometido a esta Junta, deseo informarle que el mismo ha sido APROBADO.

Todo proyecto a realizarse bajo las disposiciones del Reglamento de Certificación de esta Junta, estará bajo la supervisión de un inspector el cual no podrá pertenecer al contratista o constructora o ser empleado de éste. Dicho inspector deberá radicar informes de progreso MENSUALES con fotografías 4" X 6" a colores en donde se demuestre y explique detalladamente la implementación de las mejoras prácticas de manejo o mejores técnicas de control al momento de la inspección realizada. Estos informes deben ser radicados personalmente en la oficina del Plan-C.E.S.T., no se aceptarán informes radicados vía correo; sin fotos o sin su correspondiente número del plan.

Además el inspector y el proyectista deberán cumplir con las disposiciones establecidas en el reglamento antes mencionado y notificar a esta Junta cualquier deficiencia y observación respecto a que la obra se aparta del contenido del Plan-C.E.S.T.

La Sección 11 establece que toda notificación de aprobación tendrá una vigencia de un año. Esta notificación expirará el 23 de mayo de 1996, por lo que deberá solicitar una extensión al permiso previo al vencimiento del mismo.

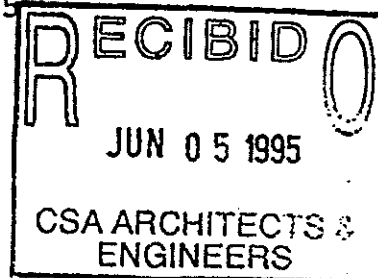


Cordialmente,

*Francisco Claudio Rios*  
Francisco Claudio Rios  
Director  
Area Calidad de Aire

23 de mayo de 1995

SR. JOEL A. GOLDBERG  
GERENTE DE PROYECTO  
PFIZER PHARMACEUTICALS INC  
PO BOX 628  
BARCELONETA PR 00617



ASUNTO: PFIZER PHARMACEUTICALS, INC.  
BARCELONETA, PUERTO RICO  
PFE-LC-09-0595-0663-I-C

Estimado señor Goldberg:

Me refiero a su solicitud para la aprobación de la fuente de emisión de epígrafe.

Luego de someterse la documentación necesaria y realizarse la evaluación correspondiente, SE AUTORIZA la fase de construcción del proyecto de referencia en cuanto a contaminación atmosférica respecta, ENTENDIENDOSE que, dicha fase de construcción estará sujeta a que se cumpla con los términos y condiciones que se indican en la solicitud sometida. Deberá cumplir además con lo siguiente:

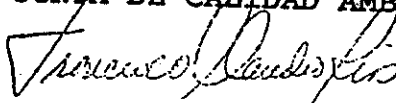
Proveer y utilizar continuamente un sistema para controlar las emisiones de polvo fugitivo en todo el proyecto.

Esta autorización vencerá el día 23 de mayo de 1996 o sea, un año después de su expedición. A tenor con lo dispuesto en la Regla 203 G, incisos 1 y 2 del Reglamento para el Control de la Contaminación Atmosférica, cada permiso para construir expirará automáticamente un año después de su fecha de expedición, a menos que dicha construcción o modificación haya comenzado, y la Junta podrá revocar una autorización en cualquier momento si se suspenden los trabajos por un período de un año o más, o si las mismas no se prosiguen diligentemente hasta su terminación.

El poseedor de este permiso deberá notificar a esta Junta la continuidad de los trabajos con treinta (30) días de anticipación para mantener vigente la autorización.

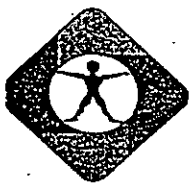
Cordialmente,

JUNTA DE CALIDAD AMBIENTAL



Francisco Claudio Ríos  
Director  
Area Calidad de Aire

AI-JR-msa



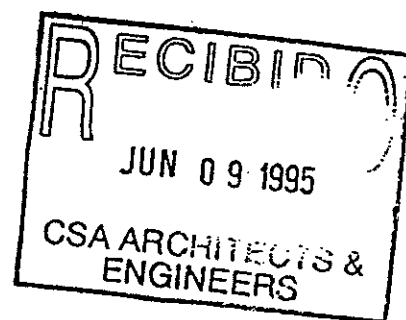
**GOBIERNO DE PUERTO RICO  
OFICINA DEL GOBERNADOR  
JUNTA DE CALIDAD AMBIENTAL**



**COPY**

24 de mayo de 1995

Ing. María del Pilar Puebla  
Mercantil Plaza, Mezzannie Suite  
San Juan, PR 00918



RE: Permiso DS-3  
AG-95-09-0243  
Barceloneta, PR

Estimada ingeniero Puebla:

Le incluimos licencia para una actividad generadora de desperdicios sólidos no peligrosos, cuyo período de vigencia expira el día 16 de junio de 1996.

El proyecto consiste en construir un edificio de dos pisos, habilitar áreas para tanques de almacenamiento de amoníaco y áreas de carga y descarga de esta. También construir una estructura para instalar una chimenea y una bomba para descarga de diesel en las facilidades de Pfizer Pharmaceuticals, Inc., en Barceloneta, PR. Se generará alrededor de 18<sup>libras</sup> diarias de desperdicios que consta de desperdicios domésticos, escombros, pedazos de asfalto, etc. Estos serán dispuestos en el Vertedero de Barceloneta.

Esta licencia es intransferible y una vez finalizado el tiempo concedido, la misma no será renovable. Esto quiere decir, que para obtener otra licencia de actividad generante para el mismo proyecto deberá radicar nuevamente.

Es sumamente importante señalar que el permiso concedido está condicionado a que se cumpla con el Plan Operacional sometido a esta Agencia y con la Regla 1005 del Reglamento para el Manejo de los Desperdicios Sólidos No Peligrosos.

La Junta se reserva el derecho de suspender o revocar esta licencia si se incurre en violación a la Reglamentación vigente.

Ing. María del Pilar Puebla  
Página 2

Cualquier duda sobre el particular, puede comunicarse con el  
Ing. Quintín De Jesús al teléfono 757-8124.

Cordialmente,

A handwritten signature in dark ink, appearing to read 'Israel Torres Rivera', written in a cursive style.

Israel Torres Rivera  
Director Interino  
Area Control Contaminación  
de Terrenos

QDJR/fsp



GOBIERNO DE PUERTO RICO  
OFICINA DEL GOBERNADOR  
JUNTA DE CALIDAD AMBIENTAL



AREA CONTROL CONTAMINACION DE TERRENOS

Permiso Actividad Generante de Desperdicios  
Sólidos No Peligrosos

Por la presente se autoriza a: Ing. María del Pilar Puebla, para que pueda realizar actividad generante en la jurisdicción Municipal de Barceloneta, por un período de trece (13) meses, autorización sujeta al cumplimiento de los Reglamentos vigentes del Area Control Contaminación de Terrenos, o a los que en adelante se dictaren.

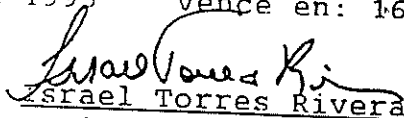
Este permiso no es transferible a otras personas o compañías. La Junta podrá revocarlo en cualquier momento si la actividad es interrumpida o si de alguna otra manera no se ha continuado o completado diligentemente.

Tipo de Actividad: Expansión de utilidades Pfizer Pharmaceuticals, Inc.

Dirección: Barceloneta, PR

Lic. Núm.: AG-95-09-0243

Fecha exp. 16 de mayo de 1995      Vence en: 16 de junio de 1996

  
Israel Torres Rivera

Director Interino  
Area Control Contaminación  
de Terrenos

QDJR/fsp

ESTADO LIBRE ASOCIADO DE PUERTO RICO  
ADMINISTRACION DE REGLAMENTOS Y PERMISOS  
OFICINA REGIONAL EN ARECIBO

Solicitud Núm. 94-07-E083-APE

AUTORIZANDO CONSULTA PARA ESTABLECER SISTEMA DE COGENERACION  
EN "PFIZER PHARMACEUTICALS, INC." EN BARCELONETA

Se encuentra ante la consideración de esta Oficina Regional de la Administración de Reglamentos y Permisos una solicitud de consulta para establecer un sistema de cogeneración a construirse en las facilidades existentes de la "PFIZER PHARMACEUTICALS, INC.", ubicadas en la Carretera Número 2, Kilómetro 58.2, Bo. Florida Afuera en Barceloneta, Puerto Rico.

DETERMINACIONES DE HECHOS

La parte proponente por conducto del Arq. José M. De Los Reyes sometió ante la Oficina Regional de Arecibo de la Administración de Reglamentos y Permisos una petición para que se le autorice radicar un anteproyecto para construcción y operación de un sistema de cogeneración como una fuente continua de energía eléctrica servir al complejo farmacéutico Pfizer, toda vez que la fuente de energía que provee la Autoridad de Energía Eléctrica (AEE) es muy susceptible a interrupciones o fluctuaciones, lo que puede traer pérdida en los productos farmacéuticos que se elaboran en el complejo.

El proyecto se construirá en dos (2) fases, ya que una caldera nueva de 30,000 libras por hora se instalará de inmediato y dentro de un (1) año se construirá la segunda fase la que consiste de un edificio de dos (2) pisos de aproximadamente 6,210 pies cuadrados, en el que se albergarán los principales componentes para la expansión de las utilidades que consisten en:

- Cinco (5) generadores de electricidad movido por diesel de 1,500 KW.
- Una (1) caldera para recuperar el calor de los "mufflers" de 30,000 lbs/hr con un quemador suplementario para usar la caldera a capacidad completa.
- Dos (2) generadores de agua helada ("absorption chillers") por absorción de 400 toneladas.
- Sistema de control computarizado.
- El equipo para controlar las emisiones de  $\text{NO}_x$ , que se conoce como Reducción Catalítica Selectiva ("Selective Catalytic Reduction").

La nueva caldera de 30,000 lb/hr. estará ubicada en un edificio (No. 113). La dos calderas existentes se removerán después que el equipo de cogeneración y la caldera a recuperar calor de los "mufflers" estén construidos y operando.

El complejo radica dentro de los límites de un distrito de zonificación de carácter industrial liviano I-1 en el cual las plantas farmacéuticas no están permitidas conforme a lo establecido en la Subsección 27.02 del Reglamento de Zonificación, por lo que el mismo constituye un uso no conforme legal de acuerdo a la Sección 3.00 de dicho Reglamento.

Considerando lo antes señalado la Oficina Regional de Arecibo de la Administración de Reglamentos y Permisos mediante comunicación del 17 de agosto de 1994 le indicó al proponente que su propuesta conlleva la aprobación de una consulta de zonificación por la Junta de Planificación previo a cualquier consideración de la misma por la Administración de Reglamentos y Permisos.

La parte proponente entonces presenta su petición ante la Oficina Central de la Administración de Reglamentos y Permisos, y luego de una evaluación de la misma, funcionarios de dicha Oficina Central entienden que la propuesta no está relacionada con un aumento en las áreas de las edificaciones destinadas a elaboración de los productos farmacéuticos por lo que no se altera ni se intensifica el uso no conforme legal establecido.

Se entiende que lo que se está persiguiendo es mejorar el sistema de la energía eléctrica que sirve al complejo, por lo que la Administración de Reglamentos y Permisos puede considerar la propuesta sin que necesariamente sea requerida la Consulta de Ubicación ante la Junta.

No obstante, la Administración entiende conveniente presentar todo lo surgido en esta Consulta ante el Comité Técnico de Coordinación ARPE-JUNTA a los efectos de que éste emita reconsideración que considere pertinente, con respecto a lo expuesto en este planteamiento.

El referido comité, en reunión celebrada el 23 de septiembre de 1994, AUTORIZA a la Administración de Reglamentos y Permisos a evaluar y considerar el proyecto, siempre y cuando cumpla con la Ley Número 9 (Política Pública Ambiental).

#### CONCLUSIONES DE DERECHO

La pertenencia ubica en un solar incluido dentro de los límites de un Distrito Industrial I-1, según el Mapa de Zonificación de Barceloneta, vigente.

Dispone la Subsección 27.02 del Reglamento de Zonificación (Planificación Núm. 4), los usos permitidos en Distritos I-1.

1. Comercio y almacenaje de productos terminados.....

58. Otras actividades industriales livianas.....

El Reglamento de Zonificación, Supra, en su Sección 3.00 rige los requerimientos y expedición de permisos.

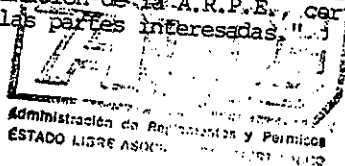
La Subsección 3.02 del Reglamento de Zonificación (Planificación 4) requiere se obtenga un permiso para (la construcción, ampliación, alteración, etc.) de cualquier estructura o edificio dentro de las áreas zonificadas de Puerto Rico.

La Subsección 3.17 del Reglamento de Zonificación dispone sobre los permisos relacionados con construcción, alteración, ampliación o reparación en pertenencias no conforme legales.

En armonía con lo expuesto y considerando todas las circunstancias del caso, por la presente, conforme a la Orden Administrativa ARP-89-4 del 1 de julio de 1989, el Director de la Oficina Regional de Arecibo AUTORIZA la Consulta para Establecer Sistema de Cogeneración en el Complejo Farmacéutico Pfizer en Barceloneta a tenor con la Subsección 3.17 del Reglamento de Zonificación y en virtud de las facultades que le confiere la Orden Administrativa ARPE Núm. 3, del 15 de agosto de 1975, emitida al amparo de la Ley Número 76 del 24 de junio de 1975. Se toma en consideración que no se amplía o intensifica el uso original o principal. Deberá cumplir con la Ley #9 (Política Pública Ambiental).

La parte adversamente afectada por una resolución u orden parcial o final podrá, dentro del término de veinte (20) días desde la fecha de archivo en autos de su notificación, presentar una moción de reconsideración ante la Secretaría de la oficina correspondiente que emitió la decisión. La agencia dentro de los quince (15) días, de haberse presentado dicha moción deberá considerarla. Si la rechazara de plano o no actuare dentro de los quince (15) días, el término para solicitar apelación ante la Junta de Apelaciones sobre Construcciones y Lotificaciones comenzará a correr nuevamente desde que se notifique dicha denegatoria o desde que expiren esos quince (15) días, según sea el caso. Si se tomare alguna determinación en su consideración, el término para solicitar apelación ante la Junta de Apelaciones sobre Construcciones y Lotificaciones empezará a contarse desde la fecha en que se archiva en autos una copia de la notificación de la resolución de la agencia resolviendo definitivamente la moción; cuya resolución deberá ser emitida y archivada en autos dentro de los noventa (90) días siguientes a la radicación de la moción. Si la agencia dejare de tomar alguna acción con relación a la moción de reconsideración dentro de los noventa (90) días de haber sido radicada una moción acogida para resolución, perderá jurisdicción sobre la misma y el término para solicitar la apelación empezará a contarse a partir de la expiración de dicho término de noventa (90) días salvo que un Tribunal, por justa causa, autorice a la agencia una prórroga para resolver, por un tiempo razonable.

Si no se radica la reconsideración la parte interesada podrá optar por radicar directamente una apelación ante la Junta de Apelaciones sobre Construcciones y Lotificaciones, dentro del término de treinta (30) días naturales, contados a partir de la fecha del depósito en el correo de la notificación de la determinación de la A.R.P.E., certificando haberle notificado con copia de la misma a todas las partes interesadas.



Cont...

- 3 -

Solicitud Núm. 94-07-E083-AP

A virtud de los poderes que me confiere la Ley, apruebo y ordeno lo anterior."

ADMINISTRACION DE REGLAMENTOS Y PERMISOS

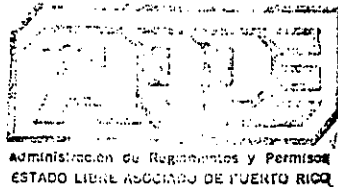
POR: ING. JUAN CARLOS RIDOT MORELL  
Director Regional

CERTIFICO: Que la anterior es copia fiel y exacta de la determinación del Director de la Oficina Regional de Arecibo de la Administración de Reglamentos y Permisos a base del acuerdo adoptado por el Comité Técnico de Coordinación JUNTA-ARPE el 23 de septiembre de 1994.

Para conocimiento general expido la presente copia bajo mi firma y notifico a todas las partes interesadas, a las direcciones que constan en nuestros archivos.

En Arecibo, Puerto Rico, hoy OCT 25 1994

*Leticia Rivera Castro*  
POR: LETICIA RIVERA CASTRO  
Subsecretaria



## **Section 4.0**

### **Miscellaneous Attachments**

## **Section 4.1**

### **Compliance with Fee of College of Engineers and Surveyors**

*Stamps were Cancelled by ARPE (see ARPE Permit in Section 3.3 of this application- "Solicitud # 94-07-E083-APE)*

## **Section 4.2**

### **Cost Estimate**

### EQUIPMENT COST ESTIMATE

EMISSION SOURCE AND CONTROL EQUIPMENT	COST
DIESEL GENERATOR 1	\$309,375
DIESEL GENERATOR 2	\$309,375
DIESEL GENERATOR 3	\$309,375
DIESEL GENERATOR 4	\$309,375
DIESEL GENERATOR 5	\$309,375
FIRST STAGE SCR 1	\$203,000
FIRST STAGE SCR 2	\$203,000
FIRST STAGE SCR 3	\$203,000
FIRST STAGE SCR 4	\$203,000
FIRST STAGE SCR 5	\$203,000
SECOND STAGE SCR	\$430,200
CONTINUOUS EMISSION MONITOR	\$81,200
HEAT RECOVERY STEAM GENERATOR	\$240,000
PACKAGE BOILER	\$154,000
STACK	\$269,000
TOTAL	\$3,736,275

DRAFT

## **Section 4.3**

### **Other Attachments**

1

Colegio de Ingenieros  
y Agrimensores de  
Puerto Rico CIAPR

2

CREDENCIAL DE MIEMBRO  
ACTIVO EXPEDIDA A:



ING. MARRERO CORDOVA RAMON

3

08186-

Número Licencia

08/31/95

Expira en

4

Secretario CIAPR

Firma del Colegiado



AUTORIZACION PARA EL EJERCICIO DE LA PRACTICA DE LA  
INGENIERIA, ARQUITECTURA Y/O AGRIMENSURA

RAMON MARRERO CORDOVA

NOMBRE

CALLE 2 D-3 ALT. DE

DIRECCION

SAN SOUCI

BAYAMON PR 00957

NUM. SEGURO SOCIAL

584-46-2440

CATEGORIA

INL

NUMERO DE LICENCIA O CERTIFICADO

8186

FECHA DE EXPEDICION

AGOSTO 1993

FECHA DE EXPIRACION

AGOSTO 1998

FIRMA AUTORIZADA

*[Signature]*



**Section 5.0**  
**Equipment List**

EQUIP. NUMBER	DESCRIPTION	P&ID NO.	CAPACITY / DESIGN INFO	DIMENSIONS
P-DG1	DIESEL GENERATOR #1	PR 113A 9041	1600 KW	214" L x 85" W x 110" H
P-DG2	DIESEL GENERATOR #2	PR 113A 9042	1600 KW	214" L x 85" W x 110" H
P-DG3	DIESEL GENERATOR #3	PR 113A 9043	1600 KW	214" L x 85" W x 110" H
P-DG4	DIESEL GENERATOR #4	PR 113A 9044	1600 KW	214" L x 85" W x 110" H
P-DG5	DIESEL GENERATOR #5	PR 113A 9045	1600 KW	214" L x 85" W x 110" H
P-TLS1	LUBE OIL SUPPLY TANK	PR 113A 9048	2000 GAL	72" D x 120" H
P-SCR1	DG-1 1ST STG NOx CONVERTER	PR 113A 9030	91 CU FT CATALYST; 95% NOx CONV.	164" L x 82" W x 94" H
P-SCR2	DG-2 1ST STG NOx CONVERTER	PR 113A 9030	91 CU FT CATALYST; 95% NOx CONV.	164" L x 82" W x 94" H
P-SCR3	DG-3 1ST STG NOx CONVERTER	PR 113A 9030	91 CU FT CATALYST; 95% NOx CONV.	164" L x 82" W x 94" H
P-SCR4	DG-4 1ST STG NOx CONVERTER	PR 113A 9030	91 CU FT CATALYST; 95% NOx CONV.	164" L x 82" W x 94" H
P-SCR5	DG-5 1ST STG NOx CONVERTER	PR 113A 9030	91 CU FT CATALYST; 95% NOx CONV.	164" L x 82" W x 94" H
P-TA1	AMMONIA TANK	PR 113A 9013	20,000 GAL	10'-6" DIA x 32' L
P-STAG	AMMONIA FLOW CONTROL UNIT SKID	PR 113A 9030	AQ. NH3 FLOW, LB/HR: PRIM. 160 EA., SEC. 40	
P-BSG1	LOW NOx BURNER	PR 113A 9034	36.0 MM BTU/HR MAX	
P-SG-1	HEAT RECOVERY STEAM GENERATOR	PR 113A 9050	30,000 LB/HR 125 PSIG STEAM	22' L x 11' W x 14' H
U-CA1	ABSORPTION CHILLER #1	PR 113A 9070	430 TONS	293" L x 99" W x 131" H
U-CA2	ABSORPTION CHILLER #2	PR 113A 9070	430 TONS	293" L x 99" W x 131" H
U-B3	PACKAGE BOILER	PR 113A 9060	30,000 LB/HR 125 PSIG STEAM	359" L x 130" W x 148" H
U-TB3G	CONDENSATE TANK	PR 113A 9014	1,000 GAL	
U-DA1	DEAERATOR	PR 113A 9014	41,000 LB/HR; 2500 GAL	6'-0" D x 11'-10" L